the OIL AND GAS JOURNAL

PUBLISHED WEEKLY JUNE 20, 1960

How Security Analysts Size up Oil's Future

as shown in an exclusive Journal panel interview

p. 78

The pressure is growing on crude prices ▸73

Universal credit card is due in August ▸82

Air-pollution talk should worry oil men ▸88

Geophysical activity dropped again in '59 ▸90

World's deepest successful frac jobs ▸100

Automation in gasoline blending ▸108

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HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

OIL AND GAS JOURNAL
Vol. 58, No. 25

Contents June 20, 1960

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The Oil and Gas Journal is published weekly by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1960 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

TECHNOLOGY—OPERATION

Drilling-Production

World's Deepest Successful Frac Jobs 100

By John C. Thrash

Successful fracturing of wells has now been accomplished below the 15,000-ft. level. Two British-American Oil Producing Co. wells responded to the deep treatment recently in southern Oklahoma, in Knox-Bromide field. Result of these superdeep frac jobs was substantial increase in open-flow potential.

How to Insure Against Blowouts 103

By T. B. O'Brien and W. C. Goins, Jr.

This is one of the most important contributions of recent years to our knowledge of blowouts. Oil company and contractor can create a climate of security against blowouts. The flow rates, so important to proper well control, can be calculated. Part 2, to be printed next week, covers a method for killing blowouts. Part 3, scheduled for July 4 issue, tells how to control kicks while making a trip.

New Big Rig Uses Only Two Engines 116

By Carl Hoot

Penrod Drilling's new Rig 15 has only two engines driving the draw works, instead of the usual three or four for deep-drilling rigs. The unit is capable of drilling to 25,000 ft. with 5-in. drill pipe. Arrangement saves on maintenance and on rigging up and moving.

Oil-Well Pumping—2 129

By Joseph Zaba

Mechanical simulators used to check design formulas.

Factors to Consider in Reserve Evaluation 136

By E. A. Hartsook

Price, payout, and interest rate are of tremendous significance in valuation calculations. Casual approaches to these factors can be just as disastrous as casual approaches to the technical evalution of future production potential. Part 1 of two parts.

Pipelining

Tanker Uses Waste CO_2 to Prevent Fire 120

The S.S. Eastern Sun is equipped with a CO_2 flue-gas system for fire control. This system has proved itself 100% effective in operation.

New Coupling Speeds Ship Loading During Storms 145

Shell Uses New Way to Cross Mississippi 145

Refining-Processing

Automation for Gas Blending 108

By H. H. Sisk

New system at Wood River, Ill., refinery of Indiana Standard provides blending flexibility, elimination of uneconomical blending, improved use of manpower, improved use of storage capacity, and improved safety.

Training Craftsmen for Electronic Instrumentation 112

By J. E. Williams

Instruments at Pure Oil's Nederland, Tex., refinery are getting better service as result of training program which includes film strip, basic electricity and electronics, laboratory experiments, and simulation of problems.

How to Tame a Sample Bomb 123

By J. C. Ducommun

Bombs for sampling light hydrocarbon liquids can be dangerous, as shown by a recent explosion at Standard of Indiana's Mandan, N. D., refinery. Result is a long look at sample-bomb materials and construction.

Questions on Technology 127

The Foreman's Page 132

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
June 20, 1960

Pressure grows on crude-price structure:

Cuts of 15 cents per barrel in Illinois basin and Kentucky following Derby's 20-cent cut in Kansas have all buyers studying their positions.

These lower priced oils compete with other Mid-continent, Rocky Mountain, and West Texas crudes (p. 73)*.

Offshoot of the price cuts: Proration is suddenly a hot topic as market weakness is blamed on overproduction from unprorated states.

It was main issue at Detroit session of Interstate Oil Compact (p. 74).

Another price victim: McComb field in Mississippi.

Producers there face a shut down July 1 unless they are willing to take a 50-cent cut and put their crude on the open market (p. 75).

▼ ▼ ▼

Geophysical work took another sharp drop in 1959, even sharper than the year before, SEG committee reports.

Crew months of geophysical activity over the world last year were 11,481, a drop of 8.9%. The drop in 1958 was 7.7%

One bright spot: Seismic activity in the U. S. actually showed a slight gain. But gravity and magnetic work were off sharply (p. 90).

Florida's Panhandle will be the scene of significant wildcat drilling (p. 85).

Mobil Oil is planning a test in Santa Rosa County which has as ultimate objective the Hosston formation at 13,000 ft. This section of Florida has never been tested below 7,000 ft.

▼ ▼ ▼

The Oil industry, after a year of mulling the idea over, is still very cool to federal proposals to participate in an experimental underground nuclear blast in Colorado oil shales.

The government's idea: Combine a nuclear blast and a

---

*Refers to article in this issue giving more details. Where no page is given, the item is a Newsletter exclusive.

subsequent fire flood in an attempt at commercial production of shale oil.

The Atomic Energy Commission-Bureau of Mines sources say oil men have made no move to get the program rolling. And the probable reasons are the high risks and outlay involved.

New study of Athabasca oil possibilities has been ordered by the Alberta government after a new group, Great Canadian Oil Sands, sought rights in the area.

Tar-sands development faces one big barrier: Alberta can't market all the oil it now can produce from conventional fields.

The government prefers just one firm to exploit the tar sands commercially now on a small scale just to prove it can be done. Large-scale development would wait the day when big new oil reserves are needed.

Decline in the value of oil stocks has been sharp

Value of petroleum shares listed on the New York Stock Exchange at the end of May was $32.7 billion. A year ago it was $42.8 billion—a drop of $10 million in a year.

The average price of oil stocks this year has been $37.67 while average last year was $56.09.

But a panel of security analysts in a Journal interview conclude: Oil is gradually meeting its problems, its position is improving, and in the long run oil stocks are a sound investment (p. 78).

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Multigrade marketing is spreading in California.

Signal is expanding its seven-grade marketing into the San Joaquin Valley. About 95 stations will start multigrade marketing there this week.

Signal, which markets under the Hancock and Norwalk brands in this area, introduced the multigrade plan into the state earlier this year in San Francisco and Sacramento Valley areas.

Universal oil credit cards will be circulated to 500,000 customers by Sept. 15.

This total will reach 2 or 3 million by January, 1961, and 25,000,000 within 5 years.

These goals were revealed at inauguration in Chicago of the new credit-card plan (p. 82).

▼ ▼ ▼

Tunisia's first refinery will be built by Italy's ENI.

Site will be near La Skhirra, Mediterranean terminal of pipeline from Edjele fields in Algeria. The deal gives Enrico Mattei one of his biggest victories over major oil foes (p. 97).

Invasion of naphthalene field by oil firms is in full swing. It's a stronghold once held by the coal-tar industry.
Latest entrants: Ashland, Sun, Tidewater, Union (p. 84).

New catalyst, stabilized silica-magnesium, will be tested commercially this year after promising laboratory tests by Davison Chemical.
The catalyst promises higher yields of gasoline and furnace oil and lower yields of coke, light gases, and residual fuel oil in fluid catalytic cracking (p. 84).

Liquefied methane movement by ship has been branded as uneconomic by Dr. Juan Pablo Perez Alfonzo, Venezuelan minister of mines and hydrocarbons.
Britain's Gas Council and Conch International have conducted a 7-voyage experiment from the U. S. Gulf Coast to Britain with liquefied methane. They have not yet revealed the economic results of the tests.
But last week in Caracas, the Venezuelan oil minister said studies revealed that gas moved by vessel is too expensive to compete in European markets. He added that Venezuelan gas would have to be sold at 10 cents per M.c.f. to be competitive in Europe.

Latin American refiners will spend more than $1.5 billion on expansion and modernization during the 1960's.
Average processor in that region will have to spend $20 million in the next 10 years to meet demands of the industry.
Back of this expected increase in business are an estimated 40% increase in population and double the number of motor vehicles. (p. 98).

▼ ▼ ▼

Interesting legal question is before Texas courts: Is Stored gas subject to the law of capture?
Lone Star Gas claims it is not in filing suit against a production firm which is taking gas from a reservoir into which Lone Star has injected 21billion feet for storage (p. 86).

Serious misgivings about Westalta's pipeline plan to export large volumes of natural-gas liquids to the U. S. were expressed during the Alberta conservation board hearing last week:
From British American, fear of a Canadian shortage and the consequences of suddenly throwing 50,000 bbl. daily on the Chicago market.
From Canadian LPG group, the same shortage fear plus one that petrochemical development would be retarded.
From Canadian Hydrocarbons, fear of another U. S. imports crackdown.

Market Memo

June 20, 1960

Gasoline demand, like Mickey Mantle's batting average, is up.

The 5.9% May increase in gasoline demand over a year ago was a shot in the arm to prices. It was a record May demand.

Result is gasoline prices for Group 3 northern shipment have advanced a full cent per gallon since May 31 and could go higher.

Buying of No. 2 for 1960-61 winter season is under way at firming prices. Supply is ample, however, for anticipated demand, and refinery capacity is more than ample.

Group 3 gasoline for northern shipment has advanced in price to 11.5 cents for 91-RON and 14.25 cents per gallon for 99-RON, each grade having taken one-fourth cent price increase on June 13.

Prices are firm at posted levels. Although inter-refinery inquiries are being made for gasoline, no discounts are now being talked.

No. 2 out of Group 3 is firm at posted price of 7.75 cents, and refiners are still in a mood to gamble and wait for price improvement.

Chicago markets on gasoline and No. 2 are looking up.

Improvement in gasoline prices since Memorial Day has raised posted prices another one-half cent per gallon. Now, 91-RON is priced at 12 cents and 98-RON at 14.25 cents per gallon with no bargain day specials.

No. 2 posted price in Chicago remains unchanged at 8.5 cents per gallon in a market that is firm but inactive.

Mississippi River markets are firm to strong. Gasoline is being quoted at prices ranging from Gulf Coast low posting to 10.75 cents for 92-RON up to three-eighths cent over that figure. The proverbial price buyers are spending more of their own money looking for gasoline bargains.

Burning oils off the river are not being pushed. This market is firm at Gulf Coast low posting of 8 cents.

In the Gulf Coast, recent heavy buying of cargo gasoline by majors from independent refiners has cleaned up current gasoline offerings. These sold-up plants are quoting posted prices for prompt liftings. One-fourth to three-eighths off posted prices for deferred liftings is the market.

No. 6 is firm at $2.10 and $2.45 per barrel posted prices for Bunker C and low sulfur grades. Reduced residual imports add strength as forward demand exceeds forward supply.

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Engineering Progress Report

FROM UNION CARBIDE CHEMICALS COMPANY

REDUCE GAS-SWEETENING COSTS

Two simple control tests increase plant efficiencies

Chemical analysis is the only quick and efficient method of gauging the operating efficiencies of plants that use monoethanolamine to sweeten natural gas. By proper interpretation of the simple, yet accurate tests, plants can be operated more efficiently and at some cost saving.

Quick titrations can give this information and enable the plant operator to keep safely below solution overloading, thus minimizing corrosion and solution contamination.

TEST NO. 1—ACID GAS CONCENTRATION

The total acid gas content of both the rich and the regenerated lean solutions is determined by simple titration. By comparing the acid gas contents of these solutions, before and after regeneration, the regeneration efficiency and the net solution loading can be determined. This net solution loading (the amount of acid gas removed by the solution) should check with an acid gas material balance around the absorber.

An excess of acid gas in both the rich and lean solution indicates solution overloading or improper regeneration.

When the rich solution loading is high, while the lean solution loading is quite modest (here indicating good regeneration), one of three things may be at fault: (1) Insufficient scrubber fluid circulation; (2) Insufficient amine concentration; (3) either more gas is being processed than anticipated, or the acid gas content is higher than originally expected.

An excess of acid gas in the lean solution, when the rich solution is not overloaded, indicates improper regeneration or severe solution contamination.

STEAM REQUIREMENTS FOR REGENERATION

Enough stripping vapor should be provided to the regeneration column to remove essentially all the acid gas from the rich solution before it enters the reboiler. Normal steam rates vary between 0.8 and 1.2 pounds of steam per gallon of amine solution circulated.

FLUID CIRCULATION

In plants with all carbon steel equipment the amine solution circulation rate should be adequate to keep the net solution loading at or below 0.4 moles of total acid gas (CO_2+H_2S) per mole of monoethanolamine. Under these conditions, in the conventional plant, the rich solution will contain less than 0.5 moles of total acid gas per mole of amine; and the lean solution will contain 0.1 or less moles of total acid gas per mole of amine.

Contamination can be controlled by a side stream distillation unit that removes foreign materials and amine degradation products.

TEST NO. 2—MONOETHANOLAMINE CONCENTRATION

By titrating a sample of the lean solution with standard HCl, to a pH of 4.5, the per cent of monoethanolamine free for acid gas absorbtion can be determined. This information allows for proper control of amine concentration and, therefore, proper setting of the circulation rate.

OTHER TESTS

Union Carbide has for many years maintained laboratories for the examination of scrubber solutions, and for basic research in gas treating technology. These are two of many analytical tests described in the paper "An Approach to Monoethanolamine Solution Control: Chemical Analysis and Its Interpretation." This paper relates chemical analysis to plant operation and suggests remedial steps found effective in eliminating operational difficulties. For a copy, use the coupon provided.

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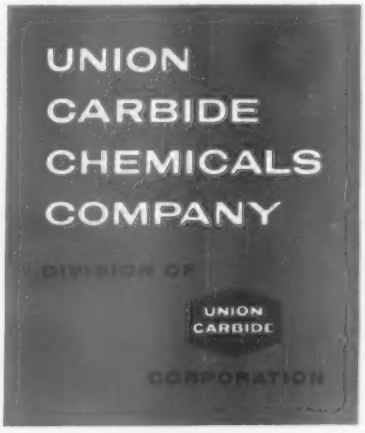

A BETTER WAY TO RUN CASING

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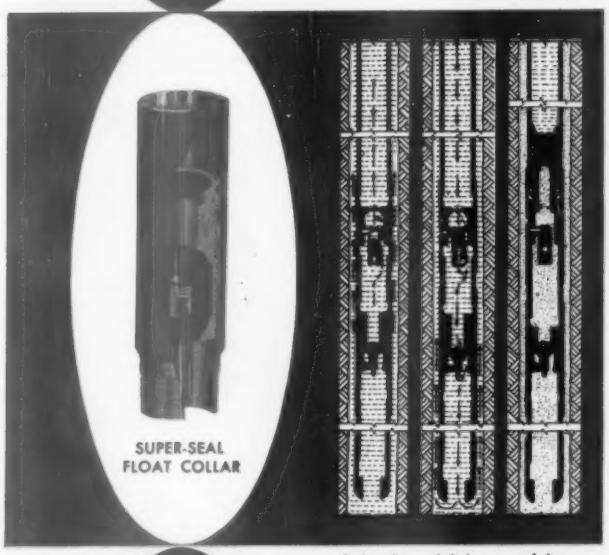
WHILE YOU

RUN IT

. . . AUTOMATICALLY

Now you can put an end to expensive rig time lost while filling casing from the surface on run-in. How? With this efficient Halliburton Tool Team –



- Make up your casing string using a Halliburton Cement Guide Shoe on the bottom . . . a Super Seal Float Collar one or more joints above it . . . and a Self-Fill Differential Collar still further up the string.
- The strong, durable Guide Shoe will help direct the casing away from ledges to minimize side-wall caving and aid in passing shoulders and other obstructions in crooked holes.
- The increasing load on the derrick will be greatly lightened by the use of the Float Collar. The efficient Super Seal valve in this tool is designed to seal off further fluid entry above it inside the casing . . . providing the floating effect.
- The Self-Fill Differential Collar is designed to help maintain a nearly balanced fluid head both inside and outside the casing above the Float Collar. A differential valve in this tool admits fluid from the annulus into the string through side ports in the tool, permitting this fluid to automatically fill the casing above the Float Collar. Construction of the valve permits full circulation down through the fill-up collar and casing in the usual manner.
- At the completion of the cementing job, the self-fill differential collar is closed by pump pressure applied after the top cementing plug has landed. If it is necessary to close the fill-up collar prior to this time, a weighted plastic ball (furnished) may be dropped to its seat for the purpose of closing the fluid entry ports.

HOWCO WELD Halliburton's popular thread locking compound . . . is excellent for use in making up floating equipment and guiding equipment and casing couplings near the bottom of the string where tight connections are a *must!* It's easier, faster – and actually *stronger than tack welding.*

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FLEXIBLE DISCHARGE HOSE incorporates the same rugged construction features as Powerflex Rotary Hose and provides the flexibility you want in this high-pressure connection between the mud pump and the standpipe. It eliminates many sharp-angle fittings and reduces turbulence and pressure loss.

MUD-FLO SUCTION HOSE is made with thick oil-resistant inner tube firmly bonded to strong cotton fabric. Heavy round steel wire reinforcement is embedded in rubber compound to absorb pumping vibrations and provide unobstructed flow.

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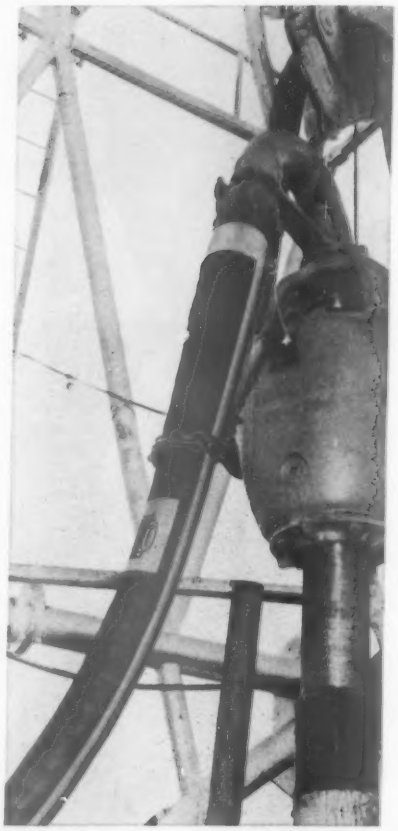
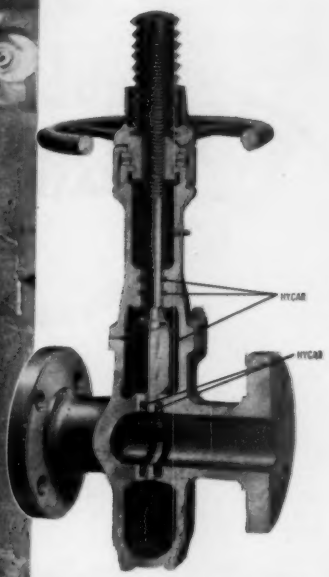


News about

B.F.Goodrich Chemical *raw materials*



Pressure sealing gate valve manufactured by W-K-M Division of ACF Industries, Inc., Houston, uses Hycar seals and "O" rings. Valves are being manufactured in sizes up to 30" for pipe line use. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber.

Two hardnesses of Hycar let valve seal both up- and down-stream

A unique seat design for these pressure sealing gate valves uses a soft compound of Hycar nitrile rubber bonded to the back of each metal seat. A tougher, even more highly abrasive-resistant Hycar compound is used on the front of each seat.

Both compounds provide resistance to hydrocarbons and oil field chemicals. The manufacturer reports successful results from tests on crude, gasoline, butane, propane, methane, alkaline solutions and kerosene.

In addition, a combination seal ring made of Hycar and steel is used at the bonnet-body connection. Hycar "O" rings are used for stem packing. They were subjected to as many as 60,000 cycles in lab tests with no sign of leakage.

Hycar nitrile rubber may be the material that will help you get more results for your operation. For more information, write Dept. FH-6, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada, Kitchener, Ontario.

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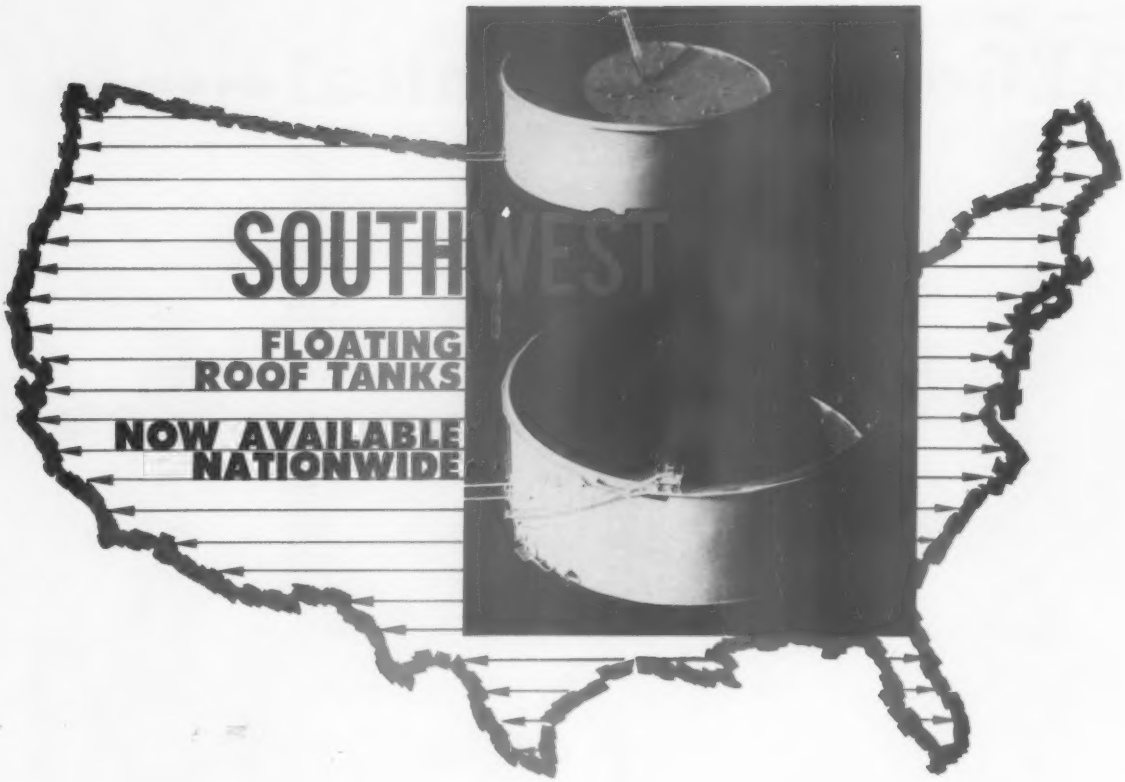

Experienced Yuba-Southwest Crews erect these famous oil tanks—anywhere

Refineries throughout the country are now served through the experienced engineering staff, extensive fabricating facilities, and responsible field erection crews of Yuba Southwest—*operating nationwide.*

This major expansion in sales, service and erection of famous Southwest Floating Roof Tanks has been brought about through Yuba's program of planned diversification and integration of the last several years. It has greatly broadened Yuba's scope of activity and geographical service area in this highly specialized field.

Before you plan your next tank installation, get in touch with Yuba. See how the capabilities of this organization can be of real help to you in the most profitable solution to all your tank problems—all the way from design to erection.

Get acquainted with all the features of famous Yuba Southwest Floating Roof Tanks. Full description is contained in Bulletin No. FRT 59-1, yours on request.

Other Southwest products for the petroleum industry include columns of various types, reactors, regenerators, vacuum towers, catalytic reforming towers, catalytic reforming units, high pressure vessels, kilns, retorts and "Dewar-type" vessels.

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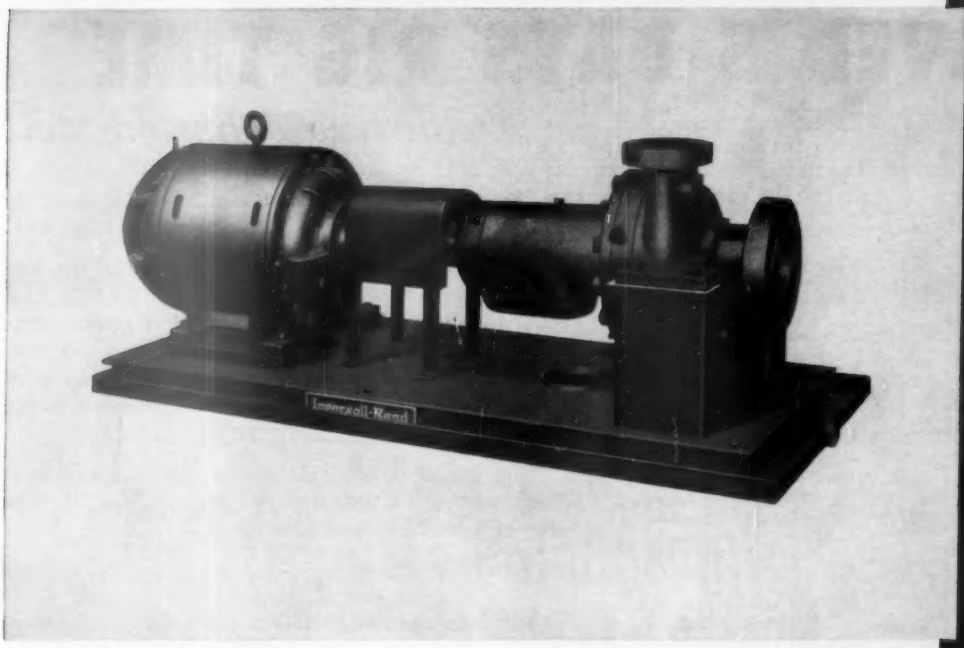
● The latest addition to Ingersoll-Rand's extensive Process Pump Line



NEW *Centerline mounted* Process Pump with integral Mechanical Seal for heads to 650 ft., temperatures to 250° F.

Ingersoll-Rand introduces a pump that is designed around the modern concepts of integral mechanical sealing, centerline mounting, ease of operation and maintenance *at lower first cost.*

Designed for handling light refinery liquids such as oils, LPGs, distillates and solvents, these pumps feature an integral single mechanical shaft seal which efficiently stops liquid losses and reduces stuffing-box attention to a minimum. The seal can be arranged for internal or external circulation. The casing is cast steel and is arranged for end suction and top discharge.

Complete Range of Sizes – The line includes 1, 1½, 2, 3 and 4 inch units with 14 basic impeller sizes covering a range of capacities to 1400 gpm and heads to 650 ft. Maximum working pressure is 400 psig. Maximum working temperature is 250°F.

Thoroughly Proven Design – Ingersoll-Rand introduced the Industry's first process pump with a built-in seal as standard equipment in 1951. All of the proven design features have been incorporated in these pumps.

Rugged, Long-Life Construction – Designed for moderate pressures and temperatures of many modern refining, petrochemical and chemical processes. A short rugged shaft, heavy-duty angular contact thrust bearing and deep groove radial bearing provide a rugged design that means long pump and seal life.

Maximum Parts Interchangeability is provided throughout the complete line. In addition, parts are interchangeable with most other types of Ingersoll-Rand vertically-split process pumps thereby greatly reducing spare part inventories.

Your nearest Ingersoll-Rand engineer will be glad to tell you more about these new pumps and help you select the best unit for your application. Ingersoll-Rand makes the world's most complete line of process pumps. There's one that's *right* for you.

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Here's how one operator

SAVED 5 DAYS RIG TIME

with new Johnston tool!

"The Johnston Selective Zone Tester saved us five days rig time!"

Mr. Ernie Walker, Drilling Superintendent, Calvert Drilling Co.

The Jordon #1 was drilled by Calvert Drilling Company in Dewey County, Oklahoma and bottomed at 11,000 feet.

Drilling the well accomplished only part of the job. Now it became necessary to evaluate all possible producing zones and complete this well if it proved commercially productive. Just as during drilling operations, any delay in evaluation is costly. An idle rig, inoperative tools, equipment breakdown, needless action—all mean lost dollars.

The job of determining subsurface formation conditions was given Johnston Testers. **A total of nine Selective Zone Tests were run:**

Test interval—9534 to 9550 feet. Dual packers top and bottom. Used Johnston Selective Zone Anchor. Good test! Released tool, picked up 8 feet to interval 9526 to 9542 feet. Re-set tool. Another good test!

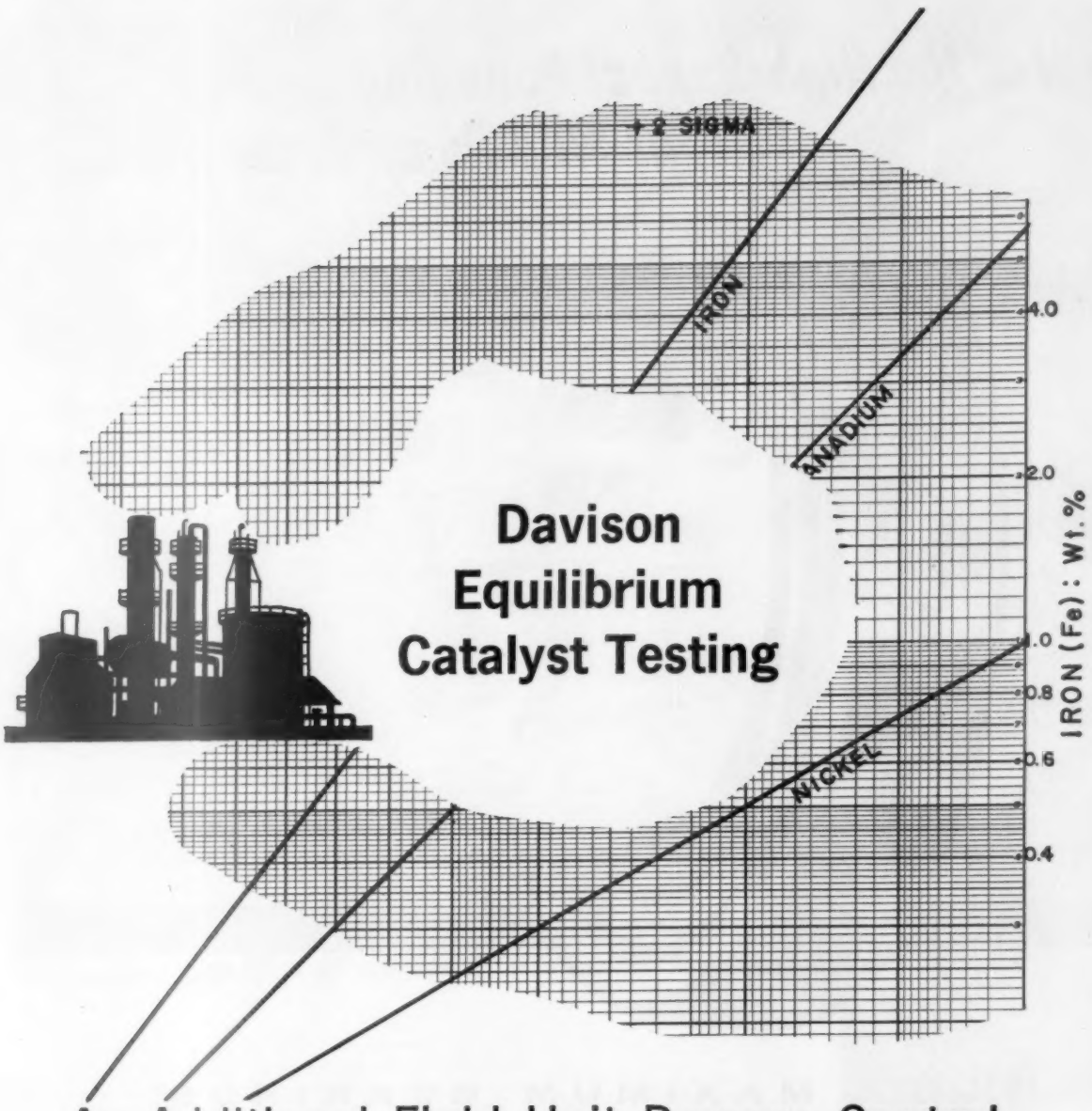
Test interval—9564 to 9685 feet. Dual packers top and bottom. Used Johnston Selective Zone Anchor. Formation failed to support mud weight. **Picked up tool and re-set seven times at different intervals.** Anchor worked perfectly, did not slide at any time!

The ability to set, release and re-set the Selective Zone Anchor allowed testing of many zones with just one trip in the hole. Extra time was saved since long tailpipe did not have to be run.

Selective Zone Testing with the new "CO" Combination Shut-In Hydraulic Tester and the new Selective Zone Anchor can save you money, too! Call Johnston Testers and learn why you get more from a Johnston Test!

JOHNSTON TESTERS, INC.

P. O. Box 98 Houston 1, Texas



Davison Equilibrium Catalyst Testing

An Additional Fluid Unit Process Control

Improve *conversion—selectivity—regeneration—fluidization* with the aid of this valuable Davison service. More than half of the fluid unit operators in North America rely on Davison Equilibrium Catalyst Testing. Find out how you can benefit. Ask your Davison representative or write Department A-06.

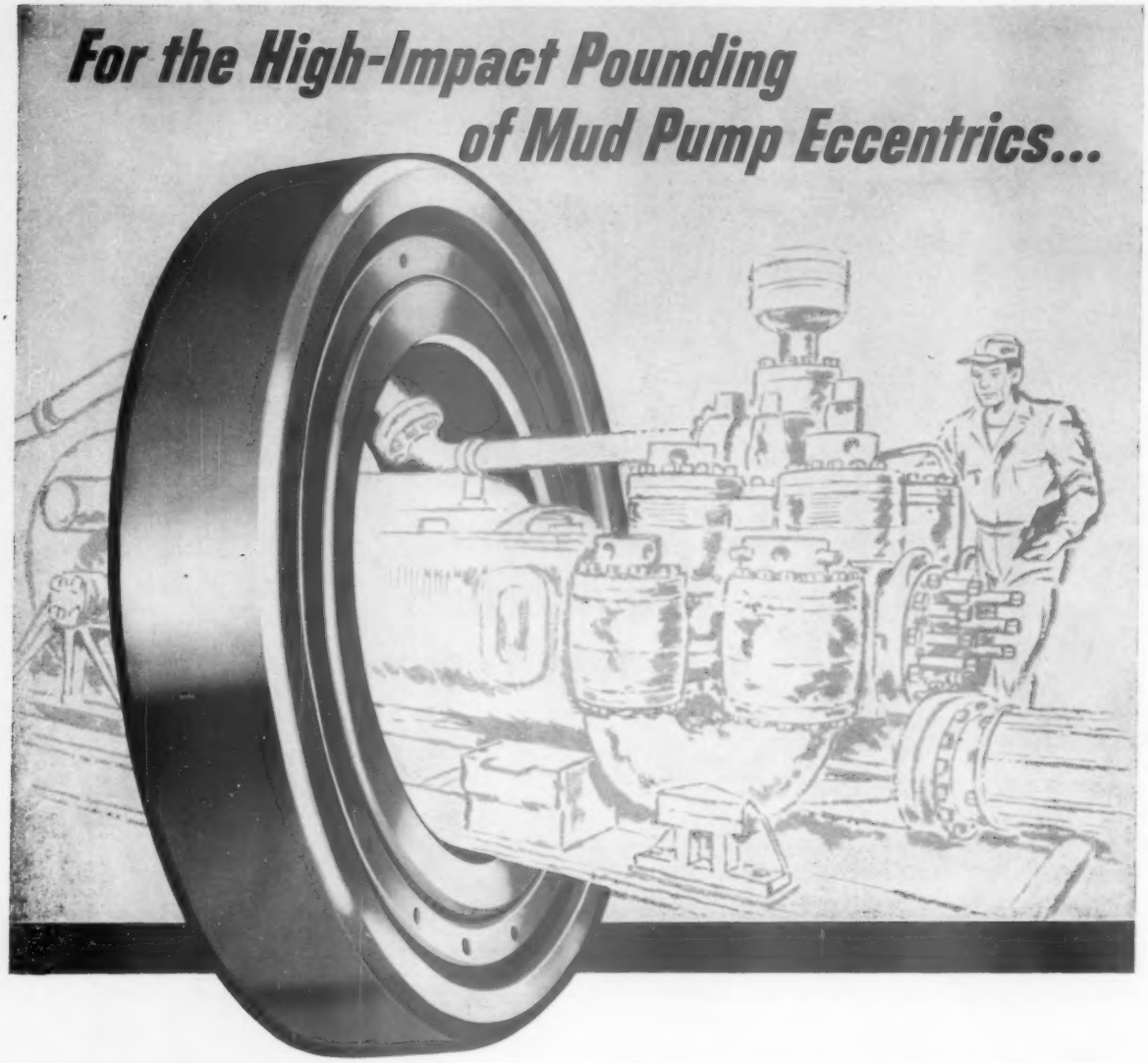
DEPARTMENT A-06

W.R. GRACE & CO.

DAVISON CHEMICAL DIVISION

BALTIMORE 3, MARYLAND

For the High-Impact Pounding of Mud Pump Eccentrics...



ROLLWAY MAXIMUM BEARINGS

Repeated high-impact loading puts mud pump eccentric bearings to a gruelling test. But Rollway Maximum Roller Bearings stand up. Their crowned solid cylindrical rollers distribute shock loads more evenly . . . increasing the life of rollers and races alike.

Rollube retainers—land-riding or roller-riding—offer better boundary lubrication to discourage skidding at low speeds. With twice the tensile strength and twice the permissible elongation of bronze retainers, closer tolerances between rollers and separators are possible, keeping misalignment and skew to a lower minimum.

In mud pumps . . . or *wherever* incessant pounding puts a premium on durability . . . specify Rollway Maximum Bearings . . . with Rollube® retainers.

Types for Every TOUGH SPOT

Transmissions • Blowout Preventers
Deep Well Pumps • Cat Heads
Speed Reducers • Traveling Blocks
Crown Blocks • Mud Pumps • Swivels
Walking Beams • Pitmans

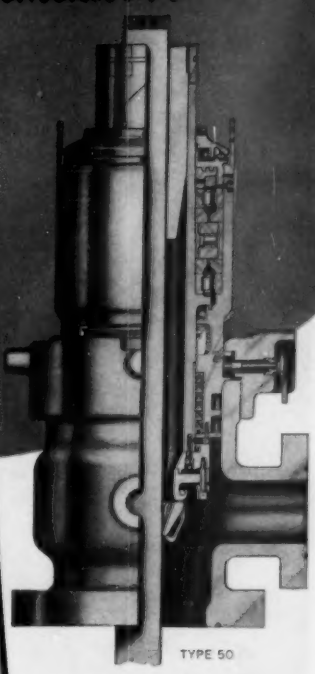
ROLLWAY®
BEARINGS
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

ENGINEERING OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto • Pittsburgh • Cleveland • Seattle • Houston • Philadelphia • Los Angeles • San Francisco

In the Forefront of New Drilling Advancements . . .

ROTATING BLOWOUT PREVENTER

You probably saw the following news item featured in recent technical articles. In it a key role was played by the Shaffer Rotating Blowout Preventer—the blowout preventer that makes possible a wide range of new savings and efficiencies in modern drilling and production techniques . . .



TYPE 50

NEW DEPTH RECORD For Air-Drilling Holes Set at 18,500 FEET!

A West Texas well, bottomed at 18,500 feet, exceeded by some 2,580 feet the former record depth established by air drilling equipment. Inasmuch as the top portion of the hole was drilled with conventional fluid circulation, and the lower portion was drilled with air circulation, some interesting comparisons are available.

For example, the data shows that both the penetration rate and the bit life increased substantially with air drilling as compared to fluid drilling. However, variations in formations at the different depths make these figures interesting but not directly comparable . . .

During air drilling, continuous pressure control was maintained with a Shaffer Rotating Blowout Preventer. Rig report states: *"No pressure control problems were encountered while this equipment was in use."*

Average Penetration Rate:
. . . with fluid, 39 ft. per day.
. . . with air, 153 ft. per day.

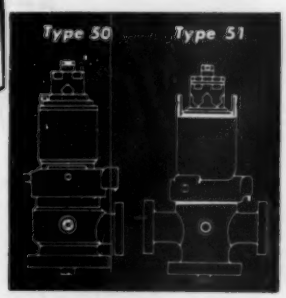
Average Bit Life:
. . . with fluid, 68 ft. per bit.
. . . with air, 672 ft. per bit.*

Longest Bit Run:
. . . with fluid, 265 ft.
. . . with air, 1,051 ft.*

(**Note:* The insert type bits used for air drilling cost about 5 times that of conventional rock bits, but averaged about *10* times the footage. Net difference, approximately 2 to 1!)

Available in two types...
Type 50 for drilling through 10¾" casing or larger.

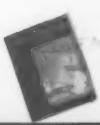
Type 51 for slim-hole drilling, drilling-in, production and re-work operations.



There is no other pressure control equipment available that will handle the range or type of applications that are routine for The Shaffer Combination Rotating Blowout Preventer and Stripper.

- Here's a unit that *automatically* maintains continuous pressure seal around the drill string as long as the string is in the hole. No special drill string equipment is needed!
- The Stripper Rubber expands and contracts automatically to seal around the varying diameters of pipe, couplings, tool joints and drill collars as they pass through the unit!
- The Stripper Rubber also adjusts automatically to fit the varying *shapes* of different drill string elements—square, hexagon or octagon kellys as well as cylindrical or out-of-round shapes of pipe, couplings, tool joints and drill collars!
- The seal remains pressure-tight whether the drill string is stationary, is being rotated, or is being raised or lowered!
- The steel-reinforced Stripper Rubber is so designed that the higher the pressure the tighter the seal. Varying pressures are compensated for *automatically!*

The Shaffer Rotating Blowout Preventer is ideal for regular drilling . . . for drilling under pressure . . . for drilling with reverse circulation . . . and for drilling with air or gas instead of mud.



Shaffer Bulletin #1003 contains complete information on this unique blowout preventer. Your nearest Shaffer representative will gladly supply complete details. Or write direct!

37 years OF OIL TOOL LEADERSHIP

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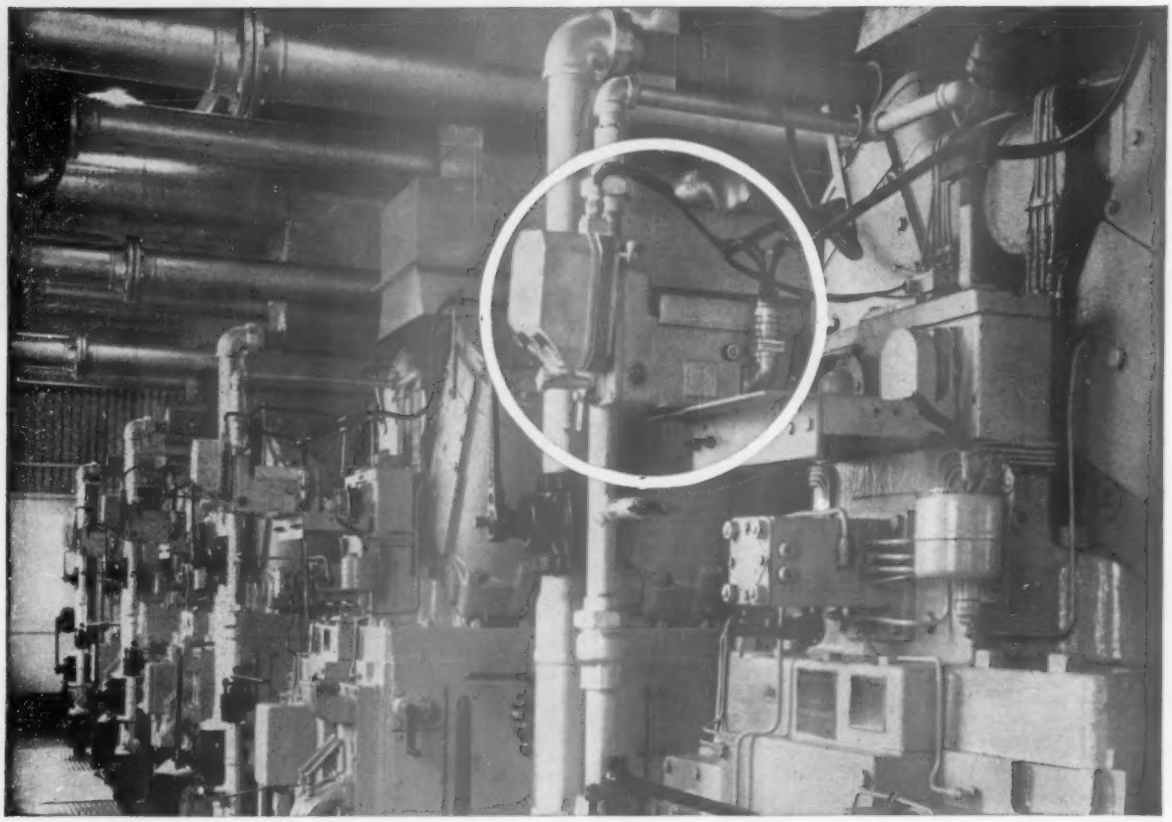
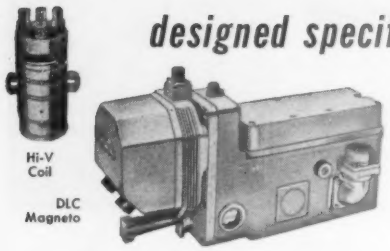
HOUSTON, TEXAS, 8006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Shaffer Tool Works, 6201 South Shields Boulevard
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 1788
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 827
HOUMA, LOUISIANA, Shaffer Tool Works, Post Office Box 546
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U. S. A.
IN CANADA: Shaffer Western Hemisphere, Inc., 5823 103A Street, Edmonton, Alberta.



BENDIX DLC IGNITION

designed specifically for natural gas and petroleum industries



A MATCHED IGNITION SYSTEM

1. Long service life
2. Simplified maintenance
3. Longer spark plug life
4. No unscheduled ignition shutdowns
5. Positive spark timing
6. High voltage output
7. Matched ignition system
8. Single or dual ignition
9. Flameproof
10. Low maintenance costs
11. For engines of 6 through 16 cylinders

At the installation shown here, DLC Ignition unfalteringly performs its function in aiding with the preparation of natural gas for consumer use.

Bendix* DLC Ignition is the result of the most modern engineering design, and incorporates the latest developments in ignition materials. That's why it meets the most exacting requirements of modern high-compression engines used by the natural gas and petroleum industries.

Because DLC Magneto and Hi-V Transformer Coils form a matched ignition system, it delivers ample voltage while, at the same time, assuring reduced maintenance costs.

If you want facts on why important operators specify Bendix DLC Ignition, write: SCINTILLA DIVISION, THE BENDIX CORPORATION, SIDNEY, NEW YORK. *REG. U.S. PAT. OFF.

Export Sales and Service: Bendix International Division, 205 E. 42nd St., New York 17, N. Y. *Canadian Affiliate:* Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec. *Factory Branch Offices:* Burbank, Calif.; Orlando, Florida; Chicago, Ill.; Teaneck, New Jersey; Dallas, Texas; Seattle, Washington; Washington, D. C.

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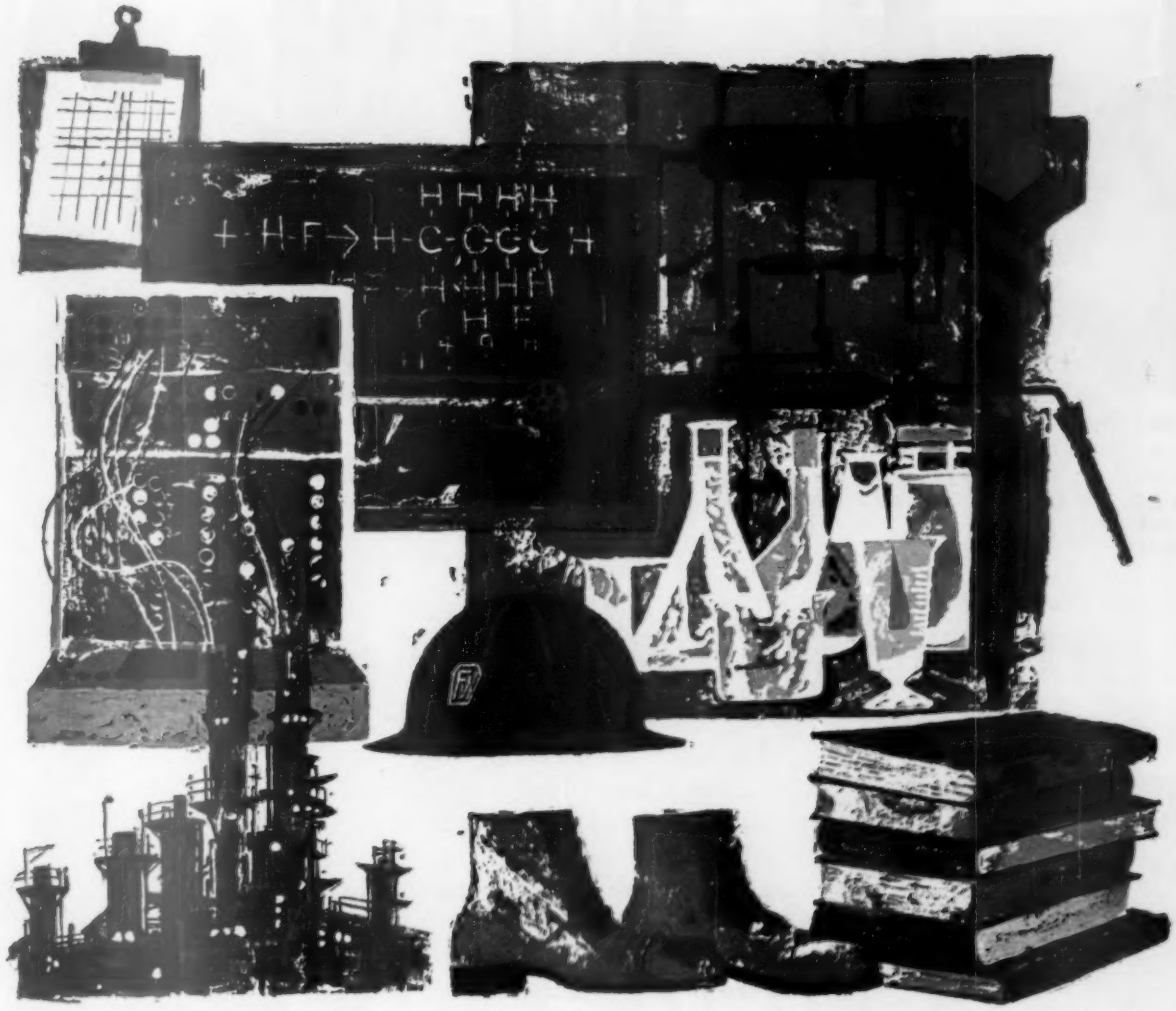
THE Bendix CORPORATION



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At Foster Wheeler you will find everything you need to make your process ideas a commercial success. There are men skilled in laboratory research and commercial evaluation to probe the practical possibilities of your ideas. To design and engineer your process plant there is a community of engineering professions—structural, heat and power, chemical, hydraulic, process . . . experts on pressure vessels and instrumentation . . . and people experienced in project management, plant construction and start-up.

From this comprehensive approach you can expect profitable operation at rated capacity soon after completion.

Two recent examples are plants delivered in good time and in good working order, operationally ready for quick write-off. They are a new ammonia plant producing in excess of 300 ton/day that exceeded rated capacity within 30 days of start-up; and a complete lube oil plant built in the Middle East which was in full production less than two years after award of the contract.

Before you specify, consult with Foster Wheeler. We are ready when you are. Foster Wheeler Corporation, 666 Fifth Avenue, New York 19, New York.

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BETTER drilling rates in all types of muds: T-8, lime, gyp, and low pH, with varying amounts of oil.

BETTER (lower) barite requirements when substituted for oil in muds.

BETTER hole lubrication, in all types of muds, to reduce pipe sticking.

BETTER bit bearing life **even in high solids muds.**

BETTER geological interpretation and electrical logs; no fluorescence.

PLAN WITH BIT LUBE to drill 5 ways better . . .

MAGCOBAR PLANNED MUD PROGRAMS make the above statements facts, not claims. In high weight emulsion muds, for example, the Magcobar engineer properly substitutes Bit Lube® for some of the oil to cut drilling costs by reducing the amount of barite required. In a typical well, the oil content of the mud was allowed to drop from 11 to 5 per cent. Bit Lube was added to this 17.8 lb./gal. lime mud with these savings in barite:

	Sacks of barite per day	Cost of barite per day	Cost of Bit Lube per day	Cost of Oil per day	Total Cost per day
Emulsion (2 week average)	177	$409.76	$—0—	$74.03	$483.79
Bit Lube and Emulsion (3 week average)	52	120.38	122.43	8.25	251.06

NET DAILY SAVINGS WITH BIT LUBE: $232.73

Not only does Bit Lube give direct cost savings, but it also offers escape from costly pipe sticking, even in extreme directional holes. Bit Lube lowers the friction coefficient of the mud, to give over-all higher drilling mud performance. These savings can be added to those in the chart.

The skilled use of good products like Bit Lube to cut drilling costs is the heart of Magcobar Technology. Let the Magcobar engineer plan the mud program for your next well and this Technology will save for you all along the line.

Magcobar
Complete
DRILLING MUD SERVICE

DRESSER INDUSTRIES, INC.
OIL • GAS • CHEMICAL
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Humble paints and protective coatings last longer—extend the interval between your repaints by six months to a year. Fewer paint jobs mean savings on paint and labor. Cost per day is that much less.

But this is your big saving: Humble coatings give you better protection—they pay off in longer life for expensive equipment.

Developed to give maximum protection under the severe corrosive conditions in refineries and chemical plants, these continuously improved coatings have been profitably used by industry for over 25 years.

For more information on Humble's complete line of paints and protective coatings call your Humble salesman, or contact Humble Oil & Refining Company, Houston, Texas.

HUMBLE

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REPUBLIC

NO HOLDS BARRED...

Bet on it. This pipe resists make-up damage. The difference is uniformity—in OD, ID, threads, and steel. You can see that difference in savings.

Republic produces ELECTRIC WELD in H-40 and J-55. SEAMLESS in J-55, N-80, and soon in P-110. BUTTRESS THREADS available in 5½", 7", 7⅝", and 9⅝" seamless.

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X-TRU-COAT IN BIGGER SIZES

PROVEN CORROSION-RESISTANCE for more jobs—and more big jobs—comes with Republic's announcement of 6" and 8" X-TRU-COAT. This is the plastic-coated pipe that stops chemical and electrolytic corrosion. This is the *polyethylene*-coated pipe that resists damage due to shipping, stringing, and backfilling. Republic X-TRU-COAT is produced under the Dekoron® Process. Republic also offers new X-TRU-TAPE Joint Wrap and Primer. Contact your Republic representative or mail the coupon for details.

ELECTROSTATICALLY LACQUERED DRUMS

PEAK PROTECTION for the product is yours with lacquer-lined drums made by Republic. The difference: Republic's ELECTRO-LAC process. A high speed distribution head disperses a fine lacquer mist. This mist is uniformly attracted (as a result of an electrostatic field produced in the drum) over the entire interior. Thin spots in the coating are eliminated. Ask your Republic Container salesman for details or mail the coupon.

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SPECIAL NYLON INSERTS in Republic NYLOK® Bolts and Nuts produce a permanent lateral thrust against opposite mating threads. No cotter pins, set screws, lock washers, wiring, or heads. NYLOK Fasteners resist age, moisture, alcohols, esters, ketones, refrigerant gases, boiling 40% caustic soda, common solvents, or temperatures ranging from 250 to −400°F. Return coupon for details.

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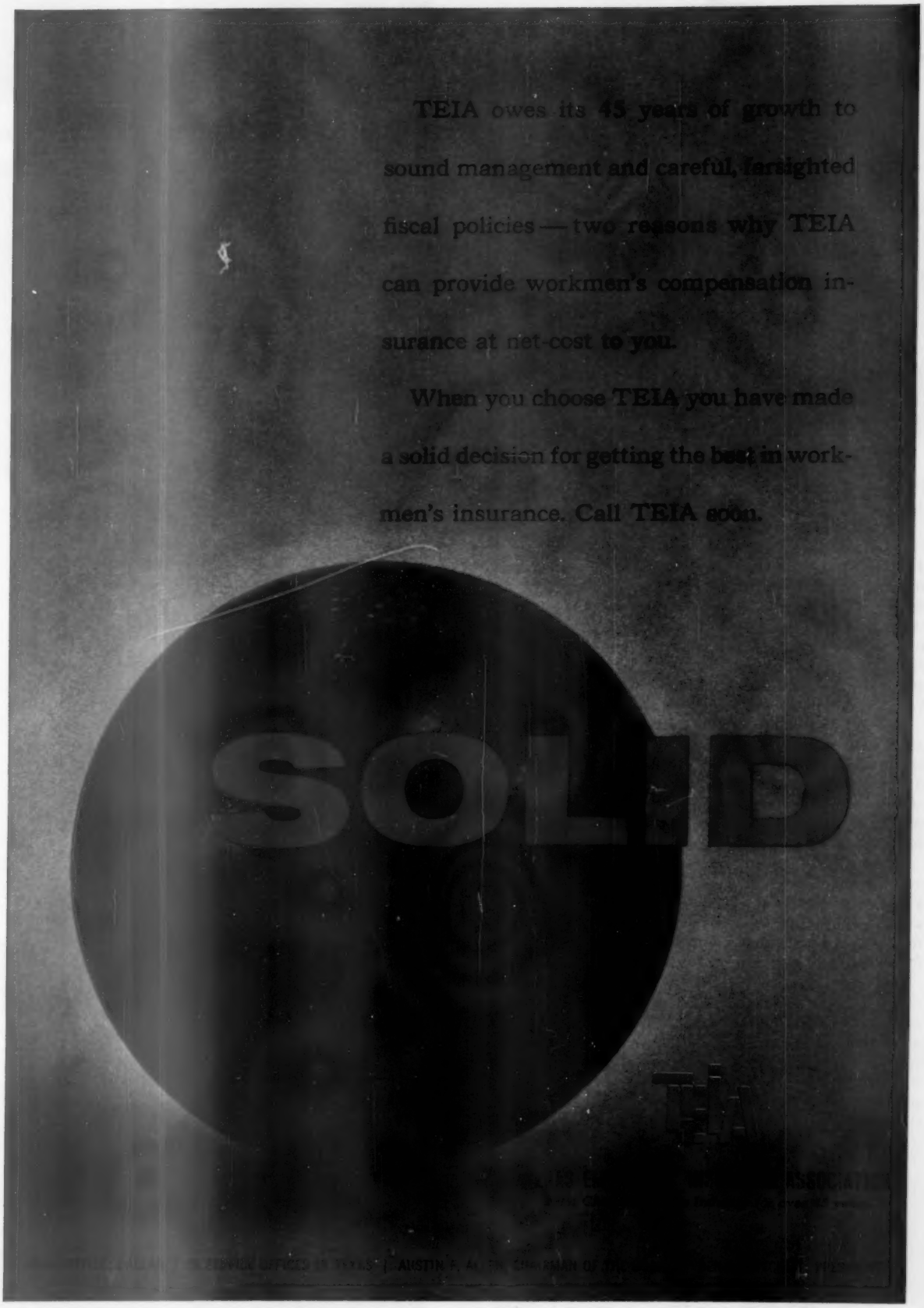
World's Widest Range of Standard Steels and Steel Products


TEIA owes its 45 years of growth to sound management and careful, farsighted fiscal policies — two reasons why TEIA can provide workmen's compensation insurance at net-cost to you.
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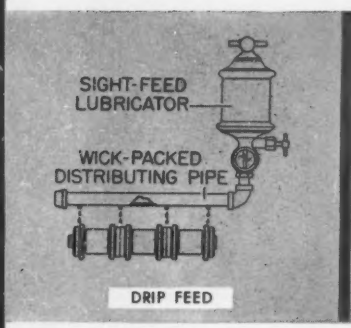
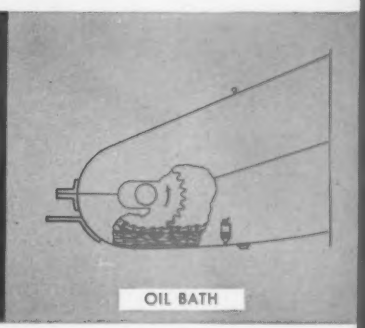
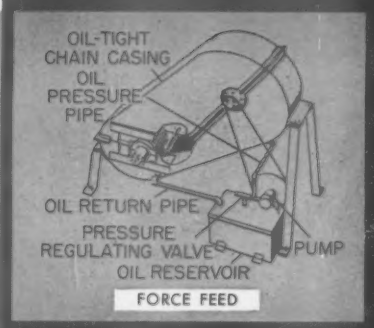
the BIG PLUS value...

Pace-Setting Research and Development

Research Shows Lubrication Has 300-to-1 Effect on Chain Life





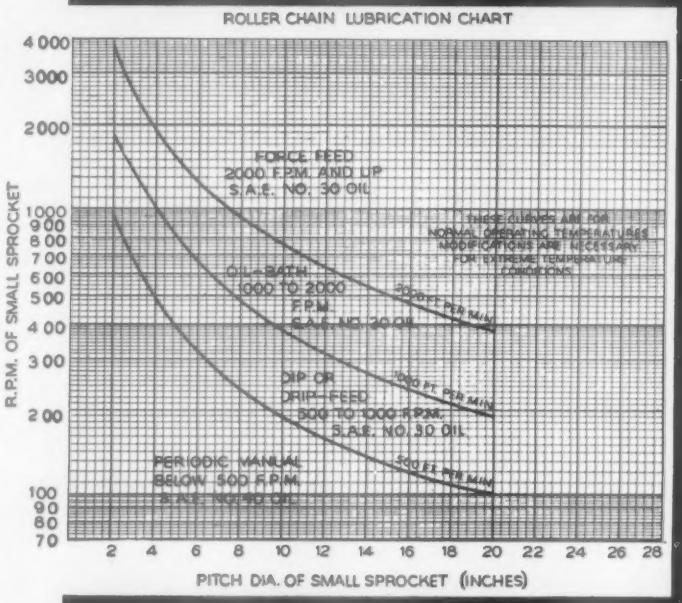


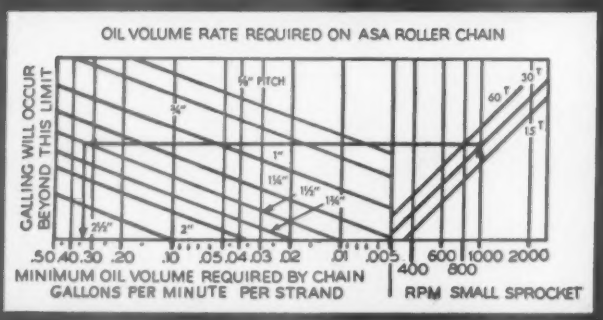
How important is correct lubrication to the life of a chain drive? Recent research by CHAIN Belt engineers has conclusively demonstrated that a difference in chain wear life of as much as 300 to 1 can be experienced on the same drive, depending upon the lubrication it receives. Extensive testing shows that merely getting oil on the chain does not assure good lubrication. The amount of oil reaching the chain is also important: not only must it be sufficient to maintain a lubricating film within the chain joint, it also carries out an important function as a coolant. A lubricating method must therefore be used to permit the oil to reach the joint in sufficient quantity.

The type and amount of lubrication required for a drive are related directly to the pitch diameter and r.p.m. of the smaller sprocket in the drive. The two lubrication charts illustrated above have been prepared by CHAIN Belt engineers to provide a guide to correct lubrication. They will assure maximum drive life in all normal drive conditions.

There are many applications where special techniques and lubricants are required. Extreme temperatures... applications where petroleum-base lubricants cannot be used...exposed drives where moisture or abrasive conditions are encountered...must be individually considered to assure maximum chain life.

Through their complete research program, CHAIN Belt engineers have gathered basic data on lubrication for virtually every type of condition. If you are concerned about the correct lubrication of your drives...if you have special problems...may we suggest you contact your local Rex District Sales Engineer. Or write CHAIN Belt Company, 4619 W. Greenfield Ave., Milwaukee 1, Wis., giving complete details of the drive and operating conditions.





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Typical A Valve Test Case History — No Pressure Loss

TYPE A FLOW VALVE

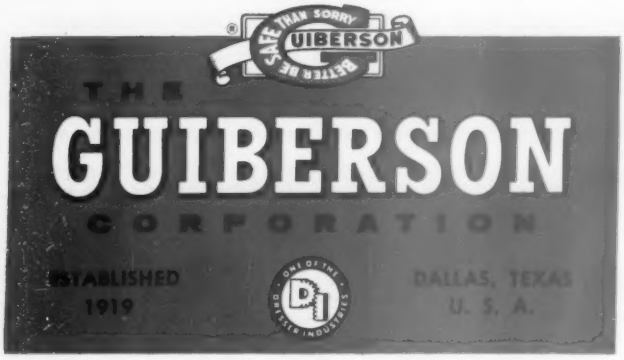
GUIBERSON'S *Type A Flow Valves are Proved Perfect Before Shipping*

Every Guiberson flow valve is pressured, then put through periodic opening and closing tests to assure operational efficiency. Each valve is electronically checked with a leak detector so sensitive it detects leaks as small as one ounce per hundred years. Guiberson valves are known to be perfect before shipping.

This unique method of quality control is the reason why Guiberson flow valves have built-in reliability.. costly pulling jobs for valve repairs are cut to the minimum. It's the reason why experienced operators say these valves have the lowest number of returns in the industry.

Guiberson's Type A Control Valves produce continuous or intermittent flow with only surface adjustment. Designed and engineered for superior performance, with tungsten carbide ball and seat that last for years. Corrosion and erosion resistant construction throughout — no rubber, no plastic, no O-rings to deteriorate.

Guiberson's Type AW Valve Is Available for Wire Line Installations. The Type AW, with integral check valve and special mandrel, lets you run in and retrieve on wire line.



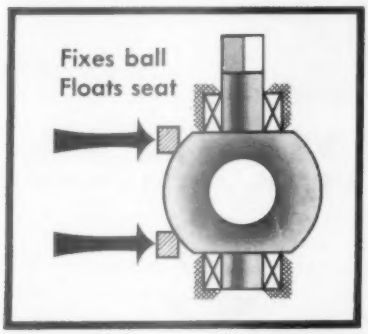
Can A Ball Valve Operate, Cycle After Cycle, With No Maintenance At All?

Read this remarkable answer, and discover an amazing engineering feat.

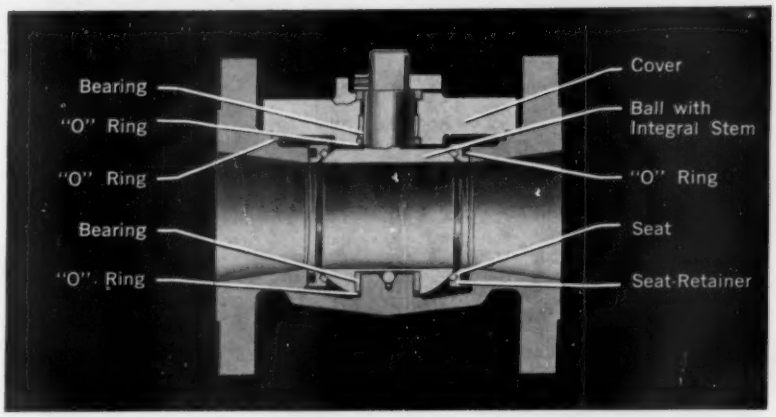
As most engineers know, ball valves offer a number of distinct advantages over all other types of valves . . . 90° on-off, minimum pressure drop, positive on-off indication, no lubrication, and compactness. In common with other valves, however, the design was insufficient to overcome the problem of continual maintenance.

Four years ago, this problem was faced by Hydromatics, Inc. in the valves that they produced for use in missiles, aircraft and ground support systems. Then, as today, all other ball valves were built with a ball that floated in its socket, and sealed by being forced against its seat by the pressure in the line. This caused seat distortion which made early replacement necessary.

Hydromatics tried a different approach. Rather than use the traditional floating ball, their engineers fixed the ball in bearings.



In the bearing-fixed **FLO•BALL** valve all pressure forces exerted on the ball are transmitted to low-friction bearings, thus eliminating down-stream seat distortion due to ball load. The pressure balanced seat, with its teflon sealing surface, is continually self-adjusted by the O-ring in the seat retainer.

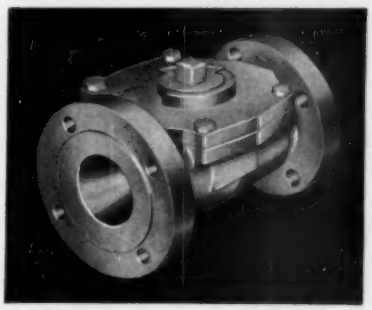


This O-ring acts as a self-energizing force that keeps the teflon seat always in contact with the ball. This insures positive sealing without seat distortion, and minimizes seat-resisting frictional forces. The combination of these low frictional forces results in low operating torque and extremely long seat life.

The bearing-fixed **FLO•BALL** valve proved itself immediately. Hundreds of missile and spacecraft systems, previously impossible, were made possible with these valves. The X-15, America's first manned space vehicle, for instance, has a Hydromatics **FLO•BALL** valve at its heart. Since its inception, the **FLO•BALL** has been used in more varied applications than all other ball valves combined.

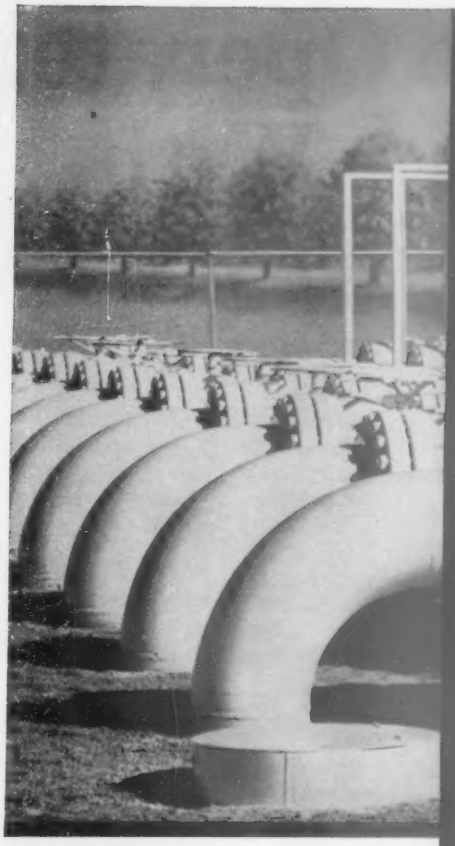
Now, after the toughest application testing in history, bearing-fixed **FLO•BALL** valves are being mass produced for industry. They are available for off-the-shelf delivery to standard ASA dimensions in semi-steel, carbon steel, stainless steel, and aluminum. They operate at pressures to 600 psi, temperatures to 400°F and hold vacuum to 10^{-6} mm. of Hg!

The bearing-fixed **FLO•BALL** offers extra ball valve advantages. Top loading for easy access without removing the valve from the line, plus three features that are absolutely unique! Self-adjusting seats which automatically compensate for wear, proportional sealing force which automatically increases with line pressure, and the lowest torque, by far, of any valve. These combine to make the **FLO•BALL** valve virtually maintenance-free!



How long does it last without maintenance? Frankly, we don't know, since the first valves we ever built are still going strong and outlasting other valve types by more than 10-to-1. But don't take our word for it. See for yourself. Call, write or TWX for further information.

Hydromatics, Inc.
Livingston, New Jersey
Telephone: WYman 2-4900
TWX-LIVINGSTON NJ 120



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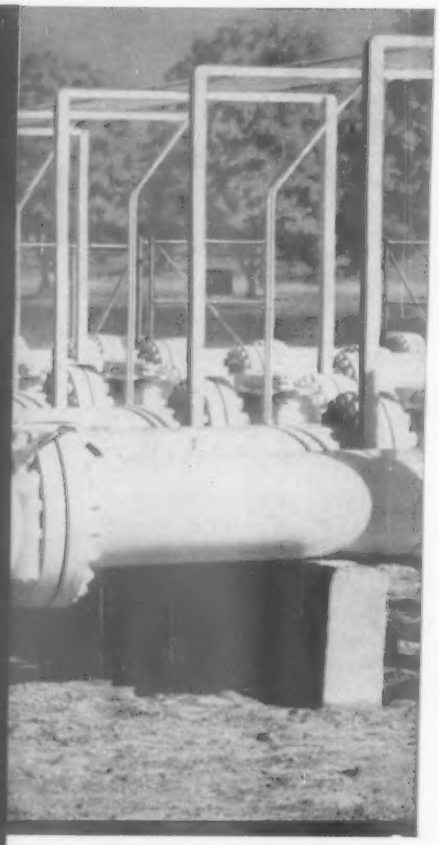

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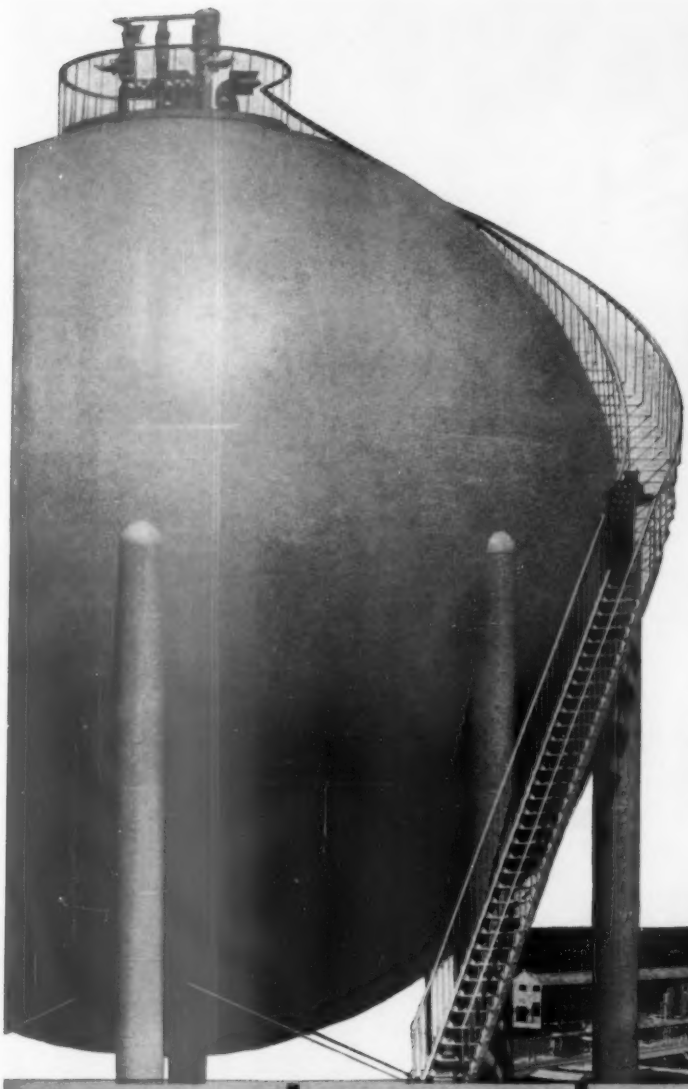
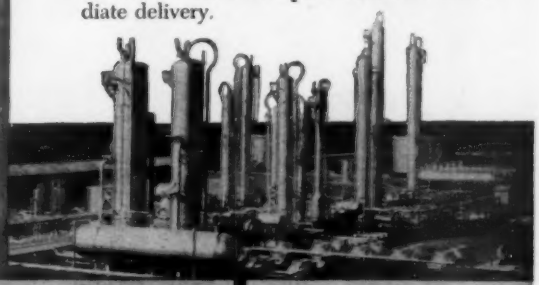
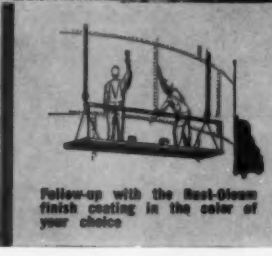
Try Rust-Oleum . . . your Rust-Oleum Distributor maintains complete stocks for immediate delivery.





Apply Rust-Oleum 769 Damp-Proof Red Primer directly over sound rusted surfaces.



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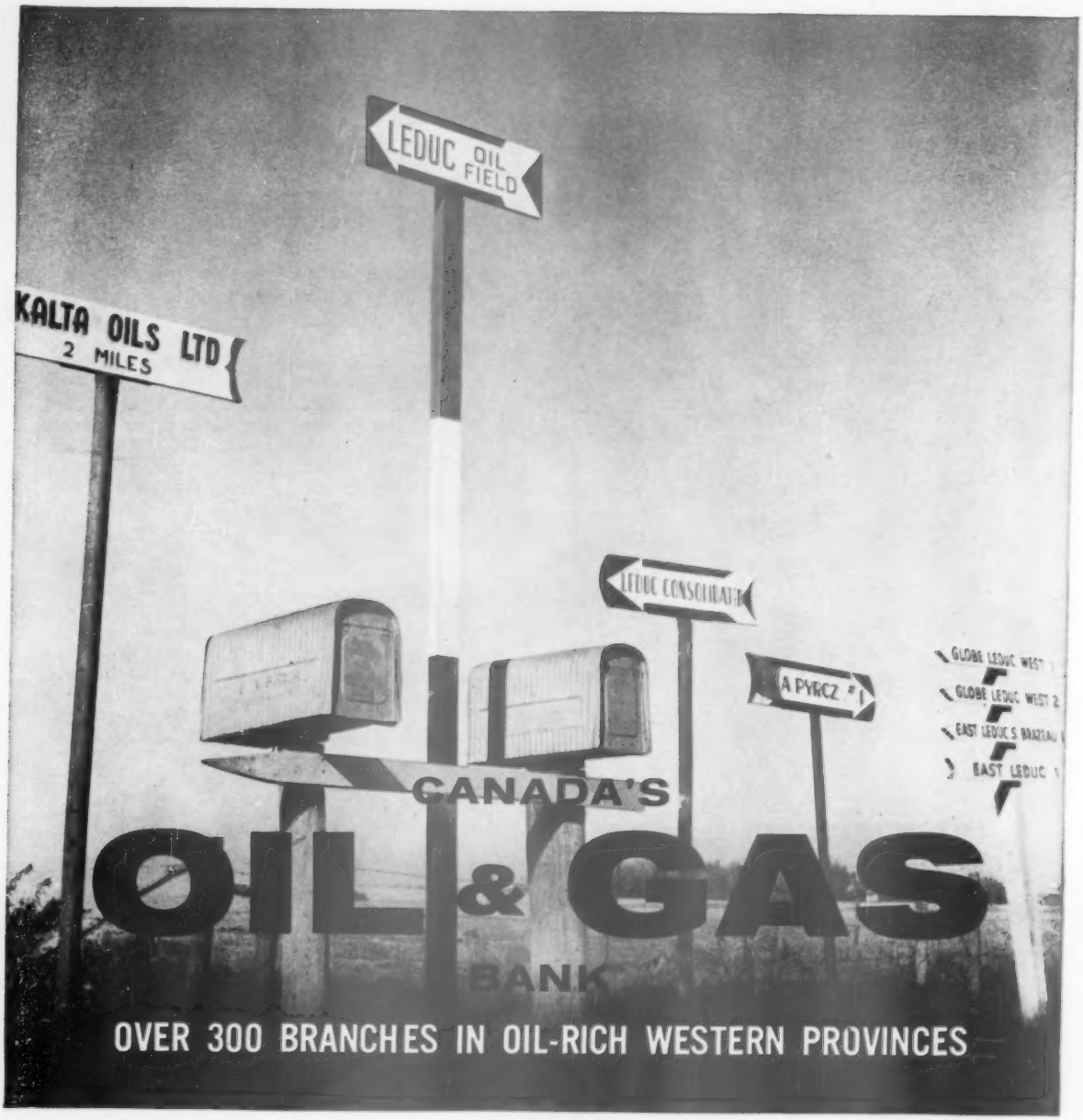

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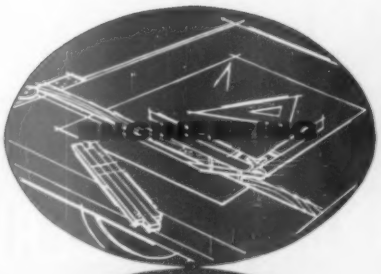
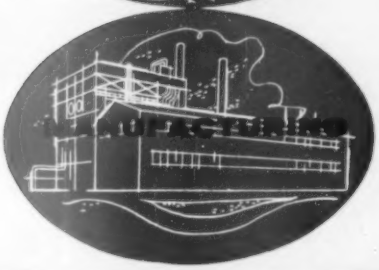


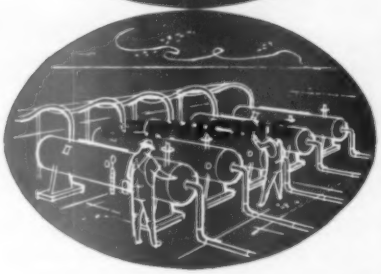
When you buy Parkersburg, you don't buy green iron and green iron alone. You buy those extras which have made Parkersburg the leader in the field of gas processing. Our **engineering,** for example, is unexcelled. At Parkersburg, we patent the process, not just the equipment. Compare our engineering with any other manufacturer's. You'll buy Parkersburg.



Parkersburg **manufacturing** is backed by an organization specializing in petroleum industry products since 1897. Rigid systems of quality control keep our manufacturing the finest in the industry, keep our units sold.

When you buy PARKERSBURG you get 'em ALL...

Installation of your Parkersburg equipment is supervised by trained men. Our men work with your men, around the clock if necessary, to get your equipment on stream promptly and operating efficiently. This is one reason, for example, why more than 150 of our DAU units are in the field today.



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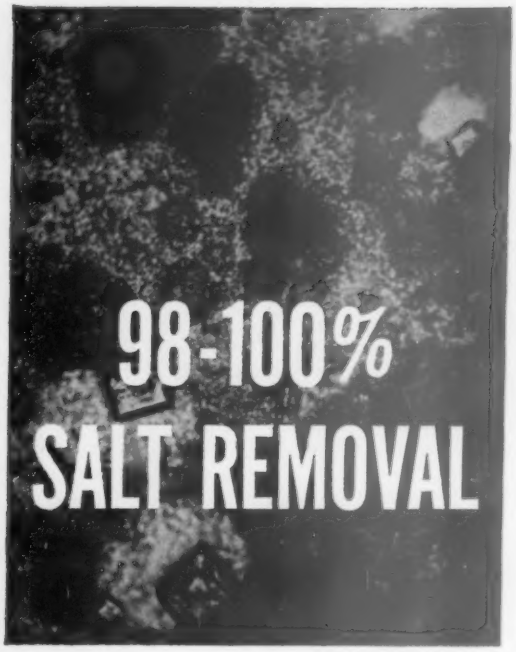

another
TRETOLITE SERVICE
report

with TRET-O-LITE *Desalting Chemicals*

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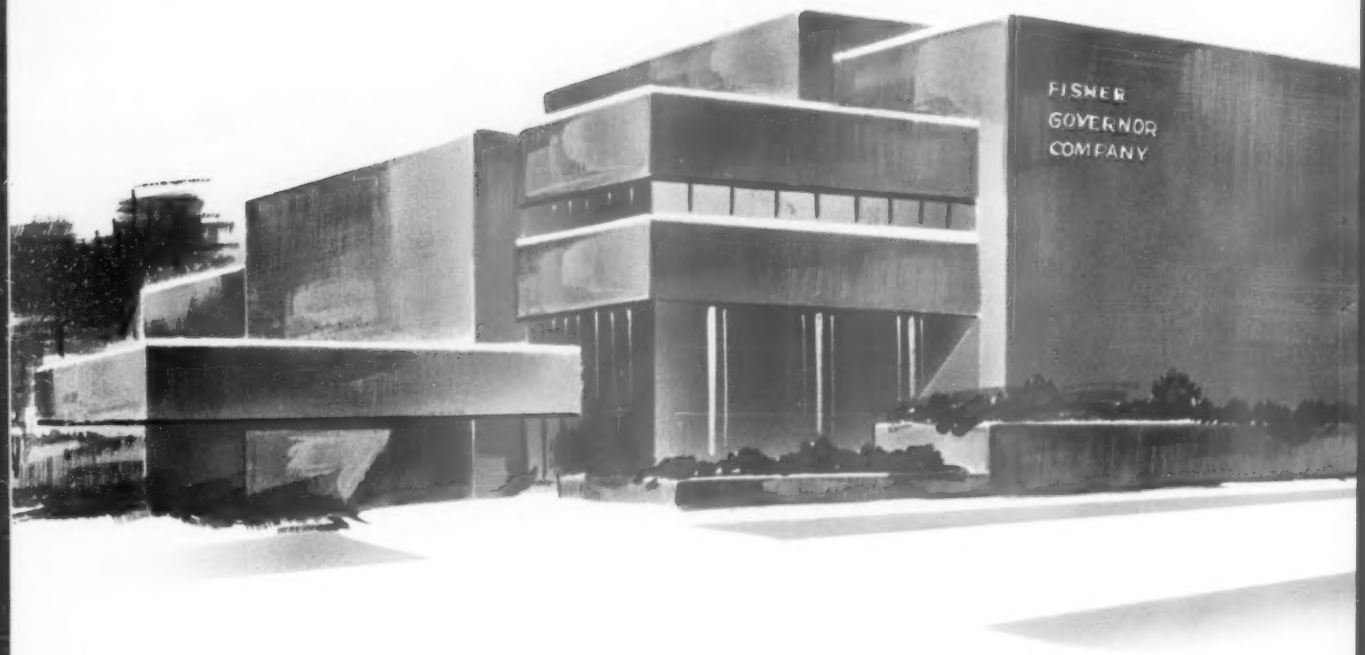

Standing firmly behind every Fisher product is the "know-how" and motivating spirit that has guided the Fisher organization since 1880. These, combined with the remarkable engineering and manufacturing facilities illustrated and described here, have made possible the slogan: "If it flows through pipe anywhere in the world . . . chances are it's controlled by FISHER."

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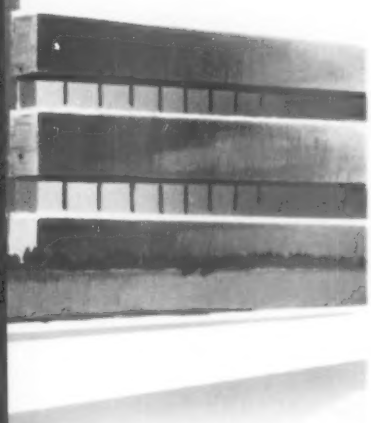
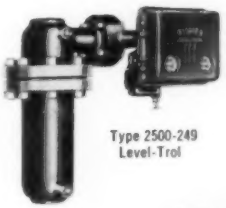
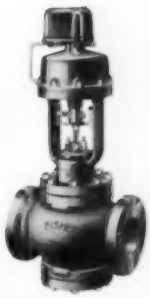


Type 657-A
Diaphragm
Control Valve



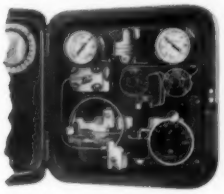
Type 2500-249
Level-Trol

Series S100
Gas Service
Regulator

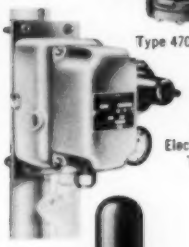


Type 470 P.O.P.

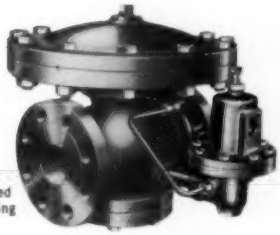
Type 350
Electro-Hydraulic
Control Valve



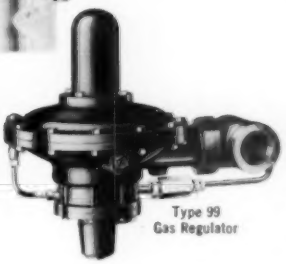
Wizard II
Pressure Controller



Type 543
Electro-Pneumatic
Transducer



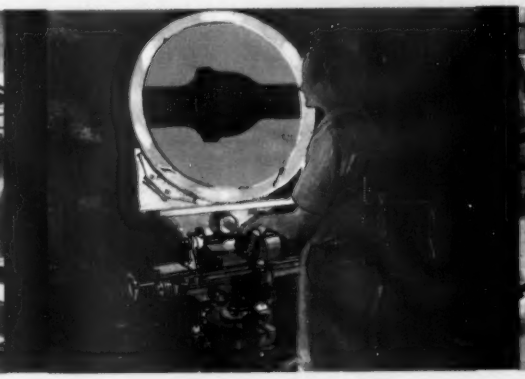
Type 92-B
Pilot-Operated
Steam Reducing
Valve



Type 99
Gas Regulator

FISHER® Controls

SINCE 1880



LATEST PRODUCTION METHODS
Various new style grinders produce a super-finish on Fisher valve guides and bushings, second to none in the industry. It is typical of precision manufacturing methods that assure long, trouble-free operation of Fisher controls in the field.

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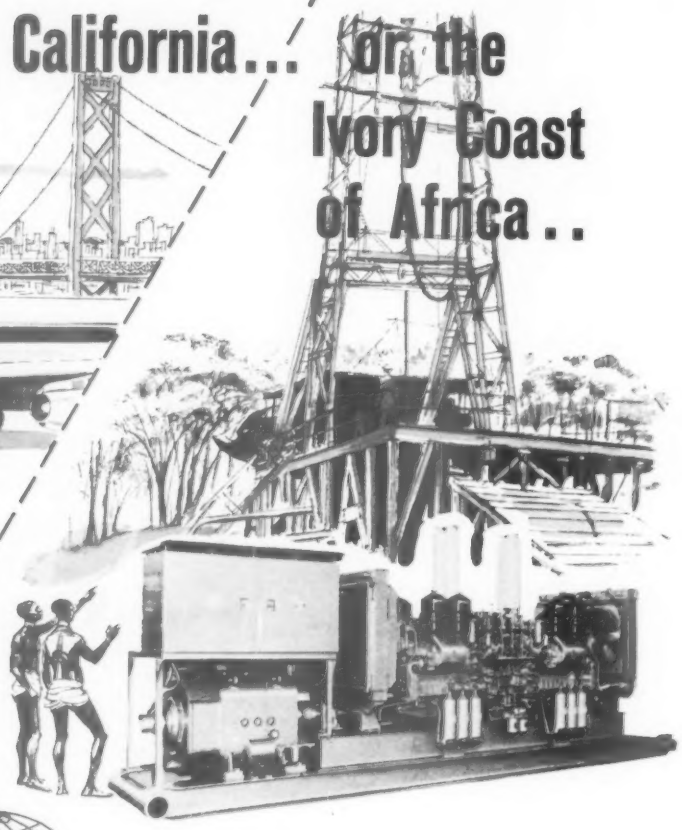
"Supermarket" 36-hour delivery, from the factory, on popular sizes and types of controls is only one of many services available to Fisher customers. 17 sales offices throughout the country maintain field stocks for immediate delivery.

In San Francisco, California... or the Ivory Coast of Africa..

Stewart & Stevenson Self-Propelled, diesel powered, Airport Utility Unit providing electric power for a giant Boeing 707 Jet Liner.



Stewart & Stevenson RIGELECTRIC engine electric power unit supplying power for drilling operations on Laughlin Porter's oil drilling rig in Africa.

When it comes to diesel or gas engine power, Stewart & Stevenson experience and "know-how" have no boundaries.

Here again are two diesel engine power applications . . . in direct contrast and in opposite parts of the world . . . with one important characteristic in common: both were designed and built by Stewart & Stevenson Services, the world's largest distributor of diesel engines. Both power applications are serving vital industries where thousands of dollars and valuable contracts are totally dependent on the reliability and performance of this engine driven equipment.

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The constant challenge and the continuous answer

The demand for ever-superior fuels from refiners is constant. The search for ever-better catalysts to help produce these fuels is continuous. At the oil companies and at Cyanamid, the searchers have found that each challenge can best be met by pooling knowledge and resources. In a word, the continuous answer lies in *cooperation*.

Cooperation with refiners helped Cyanamid develop an answer in Aerocat® micro-spheroidal synthetic catalyst. Aerocat provides high activity, stability, and selectivity through controlled physical properties. You can depend on Aerocat for efficient overall performance and satisfactory product realization.

The Cyanamid sales representative—the Man with the Golden Rule—played an important role in developing Aerocat and other catalysts. His job is not simply to sell. His job is to help you in your continuous task to meet the constant challenge. Behind his knowhow are the resources of a major catalyst producer that is also a major manufacturer of other chemicals—Cyanamid. Call when you need the aid of his skill.

Basic in catalyst chemistry

CYANAMID

AMERICAN CYANAMID COMPANY • REFINERY CHEMICALS DEPARTMENT • 30 Rockefeller Plaza, N. Y, 20, N. Y.

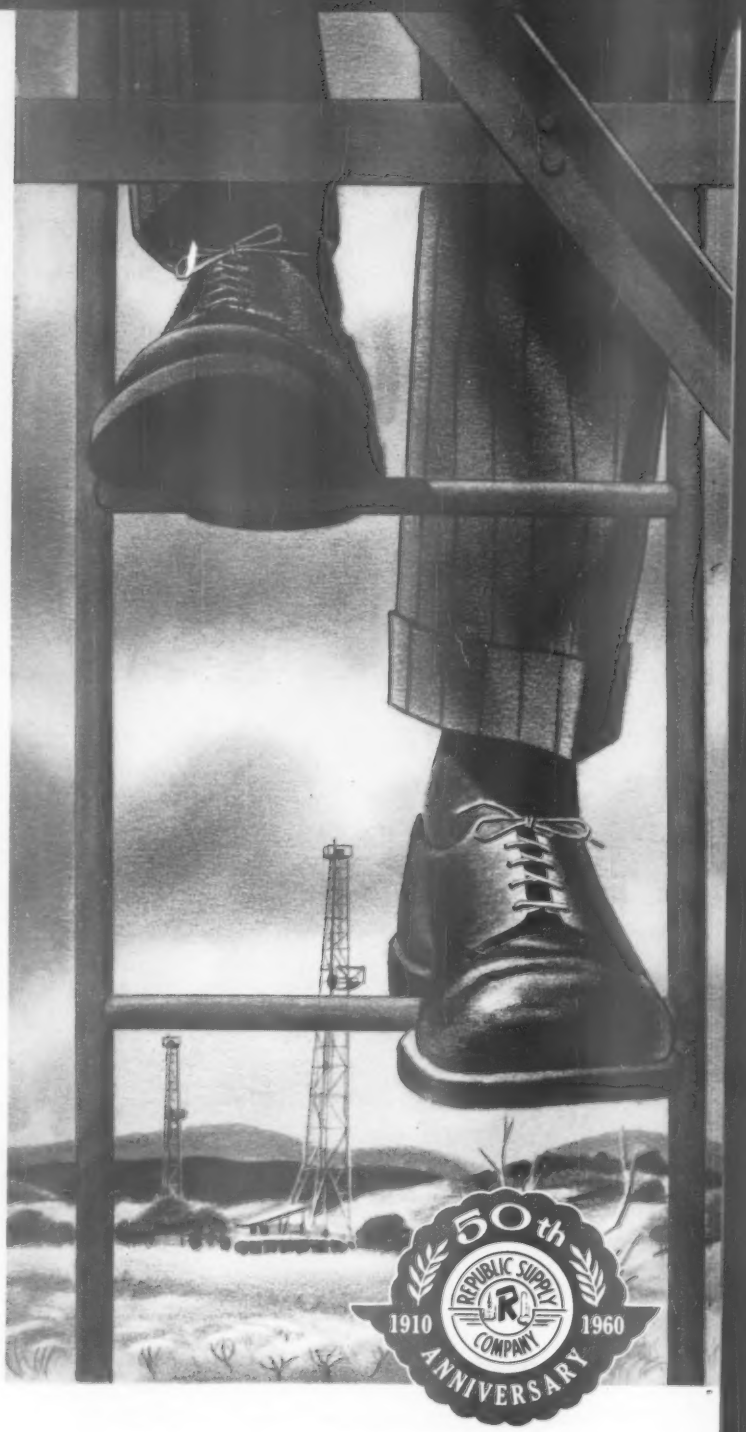
REPUBLIC SUPPLY

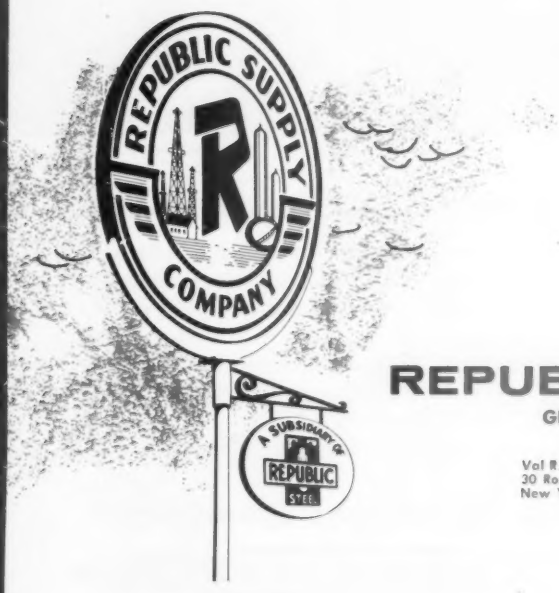
climbs to any heights . . .

. . . to deliver the goods to your rig! He'll be there day or night, whenever you need him, to help solve your drilling problem.

For fifty years your Flying "R" representative has been part of the oil country. His full line of supplies has always featured the best pipe money can buy: Republic Electric Resistance Weld or Seamless Casing or Tubing for your well.

There is a difference in supply stores. You'll see the difference the next time you need supplies or service in a hurry . . . by calling your nearby Republic Supply Representative! He'll *serve you better!*





REPUBLIC SUPPLY COMPANY

GENERAL OFFICES: OKLAHOMA CITY, OKLAHOMA

EXPORT REPRESENTATIVES

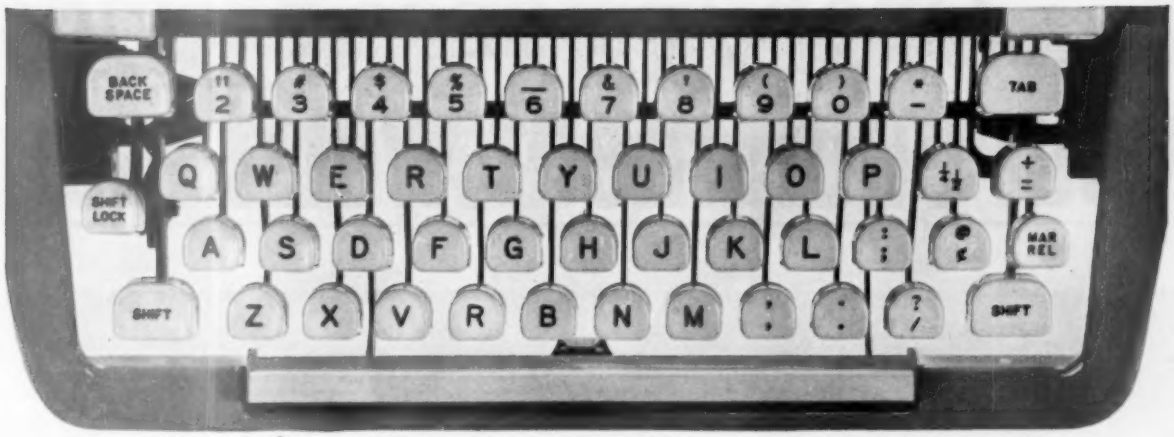
Val R. Wittich, Inc.
30 Rockefeller Plaza
New York City, New York

Matpetrol
Esmeralda 155, Piso 8
Buenos Aires, Argentina

a Subsidiary of

REPUBLIC STEEL

CLEVELAND 1, OHIO



Which keyboard is correct?

CAN YOU TELL THE REAL THING WHEN YOU SEE IT? If you could try those two typewriters, you'd discover the key difference fast.

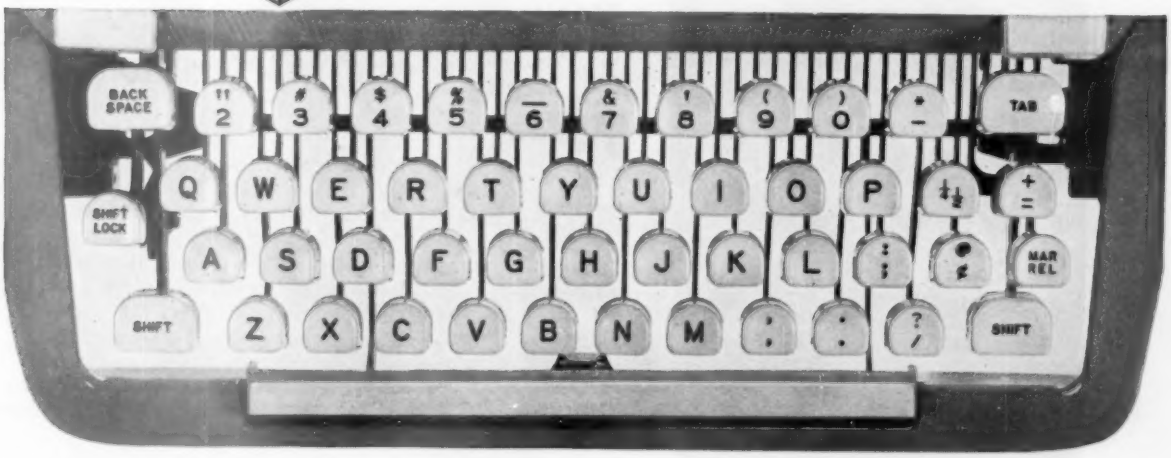
Same way with CMC. The difference comes out in use. Some grades just aren't made to do a complete job. One is. Wyandotte CARBOSE MX.

Reason: CARBOSE MX is a grade of CMC developed specifically for drilling muds. It improves sealing properties, reduces water loss . . . does all the things CMC is supposed to do for drilling muds, and does them better. Try it!

Wyandotte offers a number of drilling-mud additives, as well as materials for gas dehumidification, demulsifying, emulsifying, secondary recovery, water treatment, cementing, sweetening, and many other petroleum, refinery, and petrochemical applications. Get full details from your distributor, or write: *Wyandotte Chemicals Corporation, Wyandotte, Michigan . . . also Baton Rouge, Louisiana. Offices in principal cities.*

WYANDOTTE CHEMICALS
MICHIGAN ALKALI DIVISION
Pacing progress with creative chemistry®

ANSWER: The typewriter at the top can't spell cat . . . no C!



Onan Instapac provides your equipment won't know

WITH INSTAPAC

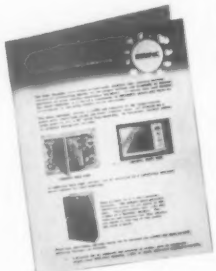
power is restored within slightly more than one cycle.

(Dotted line indicates power outage)

WITHOUT INSTAPAC

500 to 600 cycles can be lost before power is restored.

Write for free folder and specifications sheet



Complete data including diagrams showing three popular Instapac hook-ups: (1) Instapac combined with an Onan Standby Power Plant; (2) Instapac with no plant, using batteries for temporary standby power; (3) Instapac as a continuous power source for critical applications where not even the .020 seconds lapse in power can be permitted.

COMPACT SIZE. Wall Mounting: Cabinet (illustrated) 19″ wide, 30″ high, 8½″ deep. Rack Mounting: 19″ wide, 12¼″ high, 8½″ deep.

power so fast that
the main power is off

Within 20 milliseconds of a power outage, Instapac supplies emergency power . . . combined with an Onan Electric Plant you have complete standby protection

The seconds it takes to start an engine-driven standby power plant and switch it into the circuit may be too long where continuous operation is essential.

In microwave and television relay stations . . . in marine, railroad and aircraft communications . . . in telemetering . . . etc. . . . a power lapse of only seconds can jumble signals, cause wrong instructions to be sent, cause loss of valuable time, even loss of irreplaceable messages.

If you have any of these situations you need immediate power—you need Instapac.

Instapac is a transistorized inverter which converts battery current to alternating current of the proper frequency and voltage. It is rated at 1 KVA (a booster is available to raise this to 1.35 KVA) . . . 120 volts, 60 cycle; 50 cycle units also available. Instapac may be wall mounted, as illustrated, or rack mounted, to meet your requirements.

Instapac is reliable. There are no moving parts in the inverter itself such as you'll find in a motor-coupled, engine-driven standby plant where there's always the risk the engine won't start fast enough.

Instapac is manufactured by Onan, the world's leading builder of electric power plants—the only electric plants that are Performance Certified to do the job you want done . . . most dependably . . . and at lowest cost.

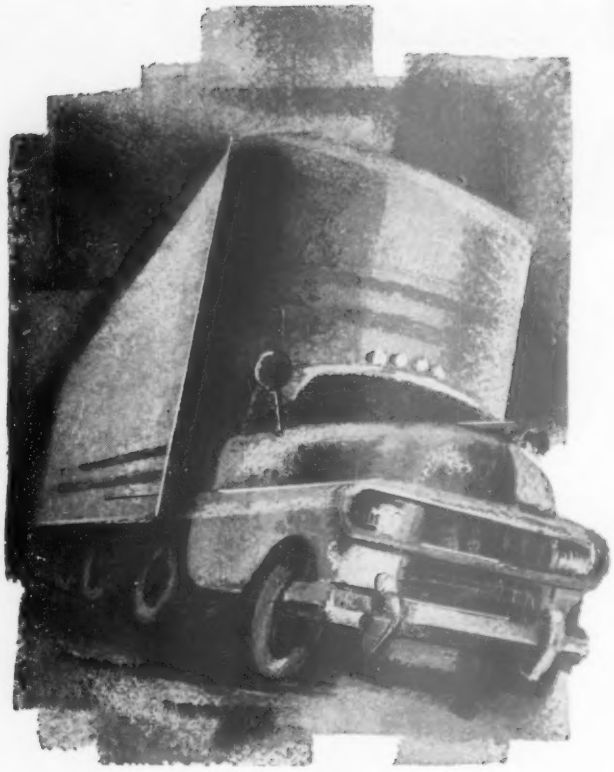
ONLY ONAN GIVES YOU THIS CERTIFICATION

PERFORMANCE CERTIFIED
We certify that when properly installed and operated this Onan electric plant will deliver the full power and the voltage and frequency regulation promised by its nameplate and published specifications. This plant has undergone several hours of running-in and testing under realistic load conditions, in accordance with procedures certified by an independent testing laboratory.
D. W. ONAN & SONS INC.
Minneapolis 14, Minnesota
Onan

Onan®

World's Leading Builder of Electric Power Plants

D. W. ONAN & SONS INC., 2590 UNIVERSITY AVE. S.E., MINNEAPOLIS 14, MINN.



New steels are born at Armco

from trucks to trikes . . .

Sheffield has the right bolts

Wherever wheels turn and people and cargoes travel, bolts are a necessary part of the picture. Remove all the bolts and civilization would fall apart.

Granted the importance of bolts, the next consideration is quality. You can be sure of this with Sheffield bolts. They're Sheffield-made and quality-controlled from furnace to finished product, in one of the world's largest bolt plants.

What's more, you can be sure of fast shipment of Sheffield bolts, in any type or size, in any quantity. Standard or special bolts, or bolt products custom-made to your specifications.

You name the need. Sheffield has the bolt. Get in touch with your Sheffield Man.

SHEFFIELD
ARMCO

BOLT PRODUCTS

SHEFFIELD DIVISION

Sheffield Plants in Kansas City, Tulsa and Houston

ARMCO

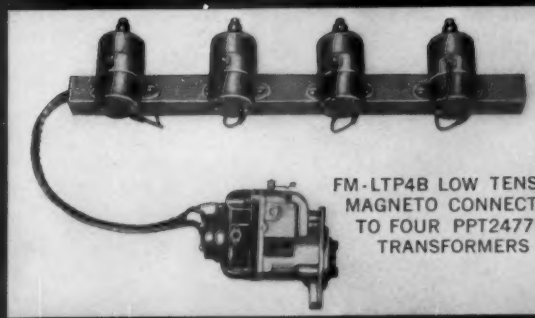
ARMCO STEEL CORPORATION

OTHER DIVISIONS AND SUBSIDIARIES: Armco Division • The National Supply Company • Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Union Wire Rope Corporation • Southwest Steel Products

We'll help you

PUMP GREATER PROFITS

(by cutting engine maintenance costs)



FM-LTP4B LOW TENSION MAGNETO CONNECTED TO FOUR PPT2477M TRANSFORMERS

Fairbanks, Morse

Low tension ignition

- **Reduces maintenance and operating costs.**
- **Increases spark plug life**
- **Easy, Quick installation**
- **Eliminates expensive stoppage in multiple cylinder units**

Now you can effectively reduce pumping and drilling costs by equipping your rig with the Fairbanks-Morse Low Tension Ignition System. Designed for spark-fired engines, this new ignition development increases engine life, helps provide trouble-free performance.

It gives a positive, intense spark **without** ozone and high-corona discharges, eliminating "green corrosion," providing better bearing lubrication.

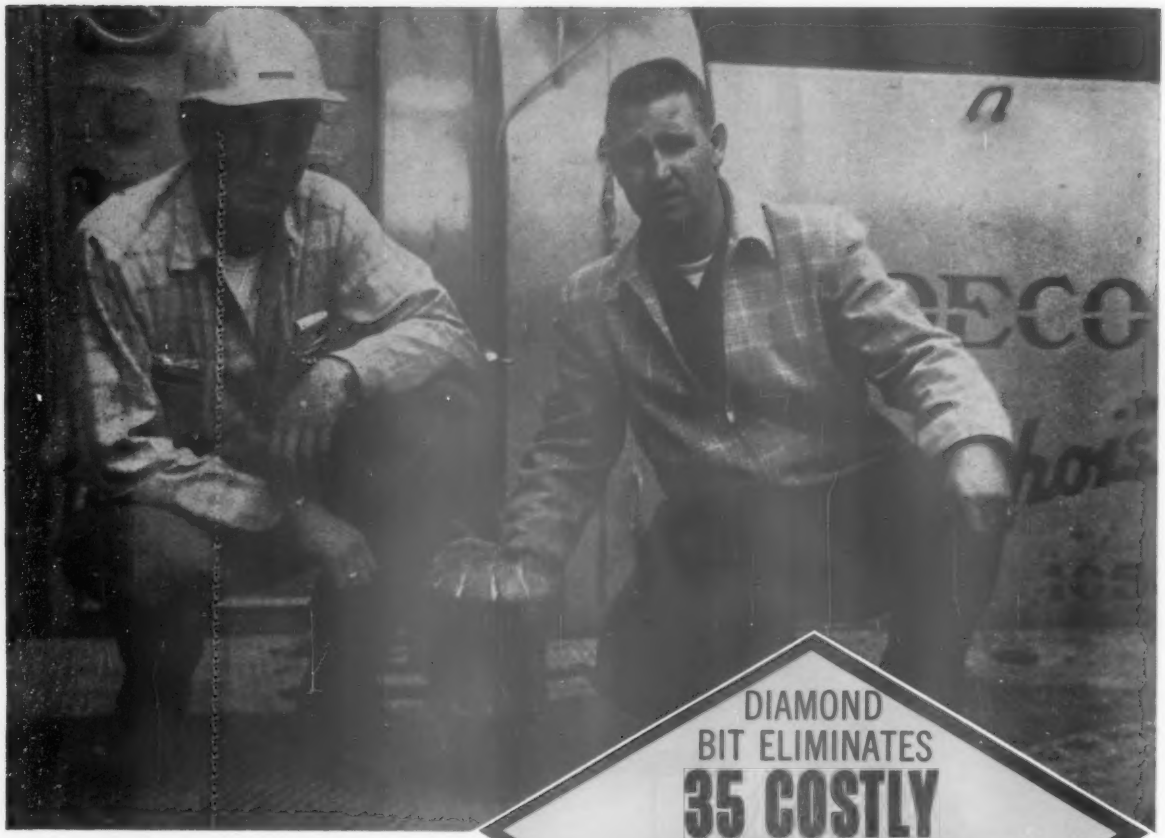
The F-M magnetos and transformers are easily installed in the field on one, two, four or six cylinder engines. Once installed, you can rely upon Fairbanks-Morse built-in quality for dependable, trouble-free operations 'round the clock.

For information as to how Fairbanks-Morse Low Tension Ignition Systems can give you stepped-up pump and drilling performance, write to: Fairbanks, Morse & Co., Beloit, Wisconsin

Fairbanks, Morse

MAGNETO AND ENGINE ACCESSORIES DIVISION

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**



DIAMOND
BIT ELIMINATES
35 COSTLY ROUND TRIPS

Christensen Diamond Drilling Bit sets endurance record of 28 rotating days on bottom

The new record was set by a major oil company using an 8-11/32" Christensen diamond drilling bit in Natrona County, Wyoming. After 28 days rotating on bottom the bit was pulled at approximately 16,000 feet and found to be in fair condition. The operating company estimated that 35 round trips and 35 conventional bits would have been needed to drill the same intervals and that the diamond bit saved 18 days.

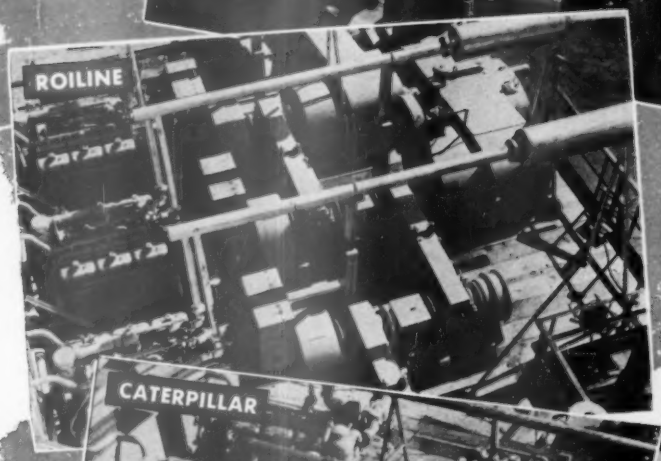
The bit operated under 10,000 to 16,000 pounds of weight at 53 to 57 R.P.M. The drill string consisted of 4-1/2" drill pipe, nine 7" collars with a set of jars. A second diamond bit had no trouble reaching bottom and ran for 16 rotating days, also surpassing the old 13 day record for the area.

For "Less Cost Per Foot" drilling, contact Christensen Diamond Products Company for information about its complete line of diamond bits and core barrels.

"Less cost per foot."

CHRISTENSEN DIAMOND PRODUCTS

MAIN OFFICE AND PLANT 1937 SOUTH 2nd WEST
P. O. BOX 387 SALT LAKE CITY, UTAH



MID-CONTINENT AE SWINGING* COMPOUND for ANY ENGINE MOST DRAWWORKS

Adaptable to any engine and most drawworks, Mid-Continent's AE SWINGING Compound is a "natural" for either a new or replacement rig drive. The patented swinging feature of this compound makes possible rig moves without opening compound cases, breaking chains or draining oil, eliminating exposure of bearings, sprockets, shafts, chains and lubricating oil to contaminating elements. Simply by pivoting the SWINGING compound to a locked vertical position, the individually skidded engine-drive units are ready to move. Designed for two or more engines totaling 800 to 2400 horsepower, the Mid-Continent AE Drives are offered with 1½" 4-strand or 1½" 6-strand assemblies. Call your Mid-Continent representative to help you match the AE SWINGING Drive to your drilling requirements.

*PATENTED

RD1-0

MID-CONTINENT SUPPLY CO.

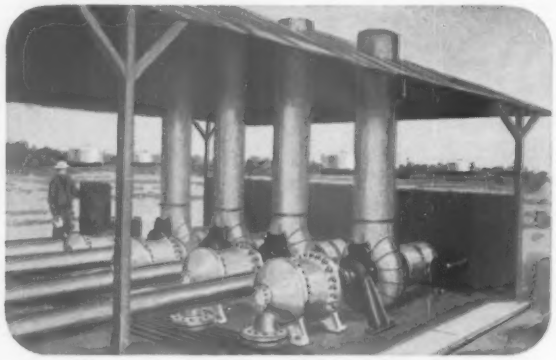
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Mid-Continent Building, Fort Worth, Texas • Export Division: 45 Rockefeller Plaza, New York 20, N.Y. Cable: MIDCUMPORT NYK

Petroleum industry benefits with Solar turbomachinery

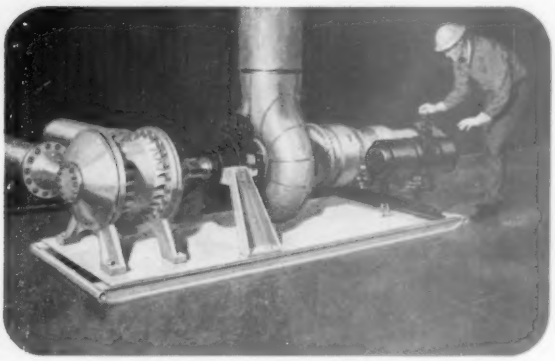
1. Easily transported

Because they are smaller and lighter than conventional power plants, Solar gas turbines are easily transported for original installation, or to a central shop for periodic maintenance. And the basic power plants, or generator sets, compressor units, and similar applications, can be inexpensively adapted for portable use.



2. Low cost installation

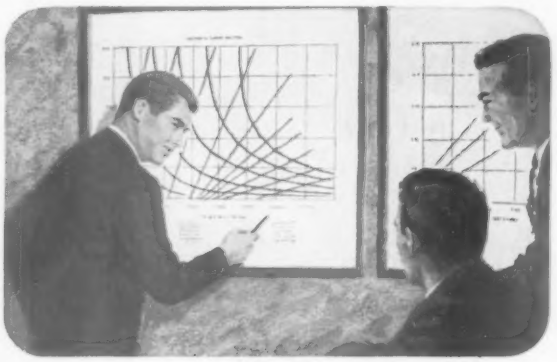
The same light weight and small size that makes transportation simple, also cuts the cost of installing Solar gas turbines and turbomachinery. Minimum vibration makes possible skid mounting or the use of present light foundations – you avoid heavy construction costs and install these units quickly without special labor requirements.



3. Simple maintenance

Solar gas turbines are simple in design, with few moving parts. They are easier to maintain than diesel or gasoline engines. Down time is cut to a minimum. Features such as interchangeable compressor wheels in Solar compressor units make quick field changes possible. Solar turbomachinery is designed for long, trouble-free life.

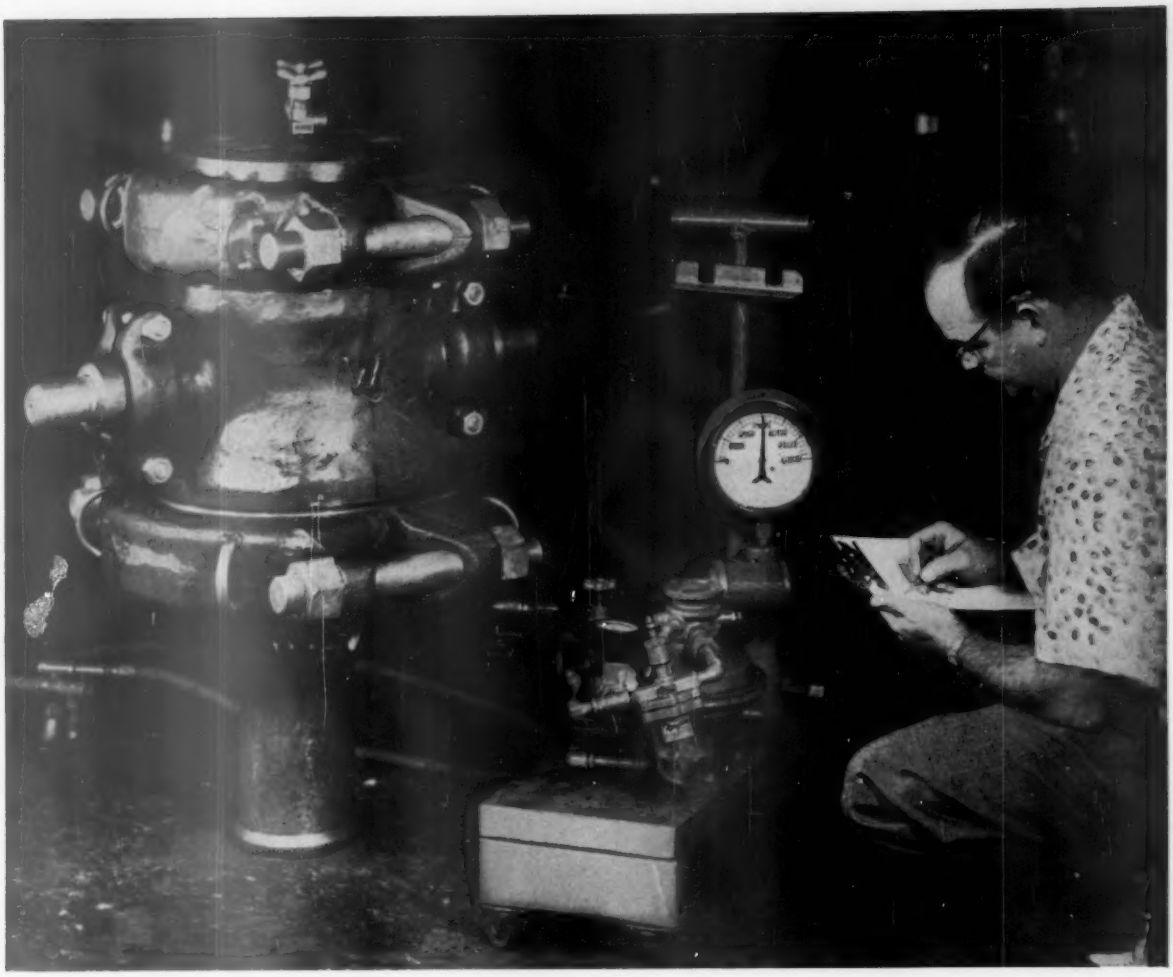
SOLAR
AIRCRAFT COMPANY



4. Low over-all cost

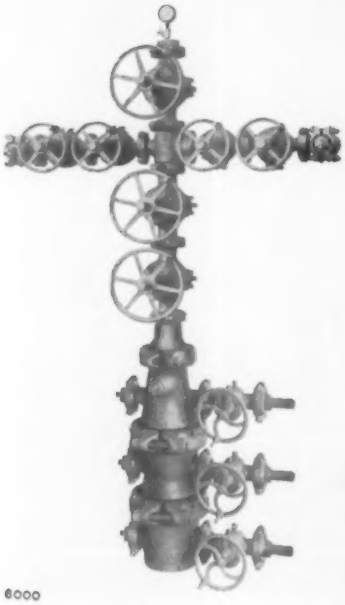
Whether you consider the capital cost of installed horsepower, or operating and service costs per installed horsepower, you will be pleasantly surprised when you measure Solar gas turbines against competing installations. We'll furnish the facts and figures you need on request. Solar builds turbines and turbomachinery to rugged industrial standards, for electrical power generation, gas compression, pumping, boat and vehicle propulsion, and for many special applications. Solar gas turbines range in size from 50 to 1250 hp.

You should investigate the profitable use of Solar gas turbines and turbomachinery. Write to Solar Aircraft Company, Dept. H-129, San Diego 12, Calif., for brochures or for information about specific applications.



Another Step In...

GRAY QUALITY CONTROL



Every Gray well head component, as well as the assembled christmas tree, is forced through tests that exceed the demands of field applications. One situation is an internal pressure test: pressures up to 30,000 psi are applied. Gray's testing laboratory is your assurance that each component will fulfill the requirements of your well drilling and completion plans.

For more information about Gray well head assemblies and Gray Systems of Well Control, write today for your copy of the Gray Catalog.

GRAY *Tool Company*

P. O. BOX 2291 HOUSTON 1, TEXAS REpublic 4-1641

6000

See why ALCOA ALUMINUM makes a good design habit

Requirement: strength without unnecessary weight plus superior corrosion resistance for world's first aluminum fly-in rig

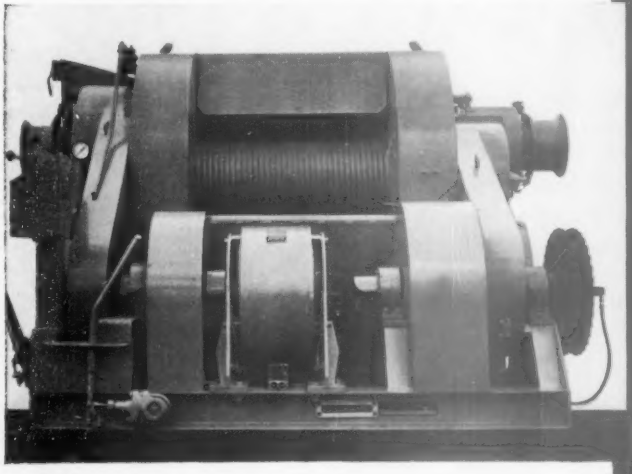
Key to good design: aluminum magnesium alloy 5456 developed by Alcoa

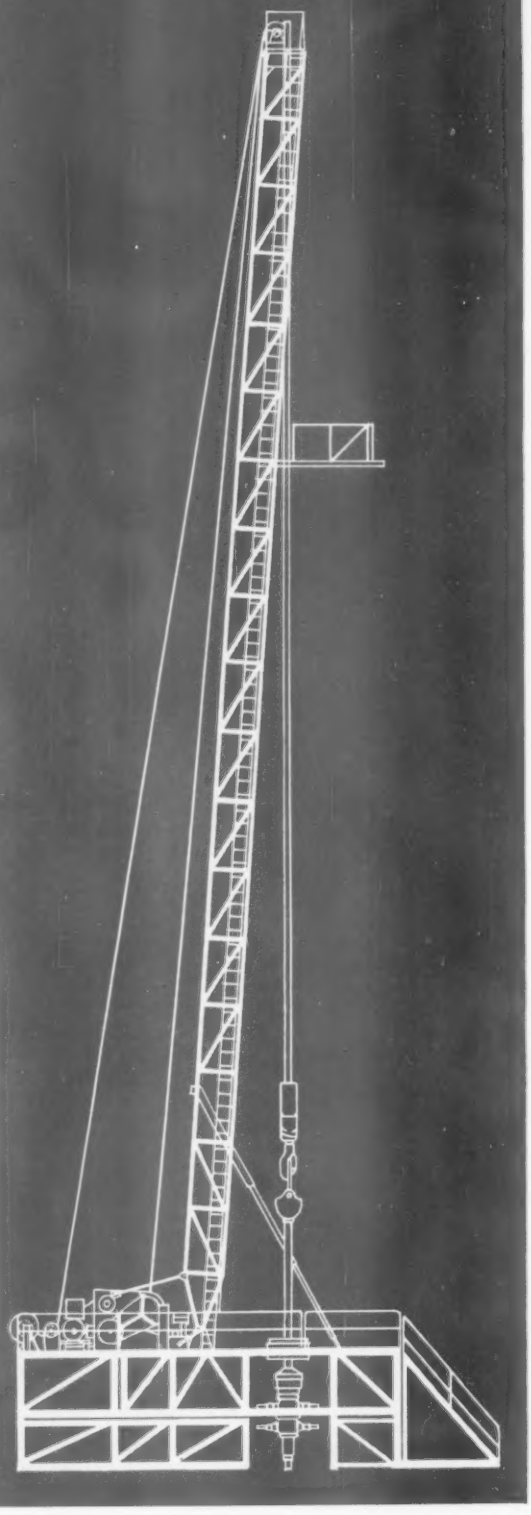
With tests in actual drilling muds, ALCOA engineers proved the superior corrosion resistance of aluminum magnesium alloy 5456 for use in the world's first aluminum fly-in drilling rig. And the excellent strength-weight ratio of this ALCOA®-developed alloy made it perfect for use in the subbase of a special Wagner Morehouse, Inc. draw works that forms the heart of the new rig.

The new rig makes extensive use of the light, strong, corrosion-resistant ALCOA-developed alloy throughout. The substructure is fabricated of aluminum structural members. A fabric mud tank employs an aluminum support frame. The suction tank and suction manifolding in the mud system are aluminum. And aluminum is used for a special shale shaker support and desanding ditch.

The new rig breaks down into 4,000-lb packages for easy helicopter transport. It will be used in hard-to-reach Central Bolivia—in a joint exploration program for Bolivia California Petroleum Co., a subsidiary of the Standard Oil Co. of California, and Compania Petrolera Boliviana Shell, Ltd., one of the Royal Dutch Shell group of companies. Loffland Brothers de Caracas C.A. is the drilling contractor.

Here you see how ALCOA engineers apply over 40 years of petroleum experience to make aluminum the good design habit for the petroleum industry. ALCOA knows aluminum and knows oil and knows how you can put the two together for more profitable operation. Our file of process industries literature will suggest many ways aluminum can serve you. To get it, write ALUMINUM COMPANY OF AMERICA, 865-F Alcoa Building, Pittsburgh 19, Pa. World-wide sales through ALCOA INTERNATIONAL, INC., 230 Park Avenue, New York 17, N.Y.





ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

"Buy the best... your supplier has it"

PRODUCT OF W-K-M's *Creative Engineering*

ACF lubricated Plug Valves are available in rectangular, round, diamond and V ports; venturi, multiport and steam-jacketed models.

Materials: steel, semi-steel, Ni-resist, carbon steel, bronze, aluminum.

Sizes: ½" through 30".

Working Pressures: 125 through 800 pounds.

5918

acf® Lubricated Plug Valves

You'll get top performance from ACF valves. They seal tight, service quickly and fit into the smallest possible space.

Both rectangular and round port valves provide through-conduit flow with minimum turbulence, minimum pressure drop. The cylindrical plug can't stick or wedge — operates with an easy quarter-turn.

Next time — and every time — ask for ACF! *Available from leading suppliers everywhere.*

WRITE FOR CATALOG 400

W-K-M

DIVISION OF acf INDUSTRIES INCORPORATED
P. O. BOX 2117, HOUSTON, TEXAS

You're Talking to Men Who Know

The men of the First City National Oil Department know oil . . . gas . . . petrochemicals. Every phase, from production to marketing! Their broad experience makes it easy to get down to business quickly, to get a decision more promptly, whether you're talking in terms of a modest collateral loan or a complete development program. Come in to see us.

SOON! First City National will be serving you in the newest, best equipped, most modern banking quarters in Texas.

FIRST CITY
NATIONAL BANK OF HOUSTON

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

what's your best estimate?

. . . a quiz for Chemical Executives who want to keep posted

QUESTION 1. In 1959, 28 plants in the United States were producing ethylene—the hydrocarbon intermediate which is way ahead of all others both in quantity produced and in versatility. What was the estimated total U. S. capacity for this valuable chemical in 1959?

a — 3.7 Billion Pounds

b — 4.9 Billion Pounds

c — 5.6 Billion Pounds

d — 6.4 Billion Pounds

QUESTION 2. How many of the U. S. ethylene plants were designed, engineered and constructed by the Lummus Company?

	PLANTS	CAPACITY
a	3	.4 Billion lbs.
b	5	.6 Billion lbs.
c	7	.8 Billion lbs.
d	9	1.0 Billion lbs.

ANSWERS: 1. *The answer is (c)—5.6 billion pounds, according to* Chemical Week's *Report on Ethylene, May 9, 1959.*

2. *Again the answer is (c). In the last 10 years Lummus has 7 Ethylene plants to its credit in the U. S. alone with a combined capacity of .8 billion lbs. Lummus' world-wide total is 13, with a combined capacity of over a billion pounds per year. For ethylene projects, or any type of process plant, call on Lummus' 50 years of experience in design, engineering and construction.*

LUMMUS

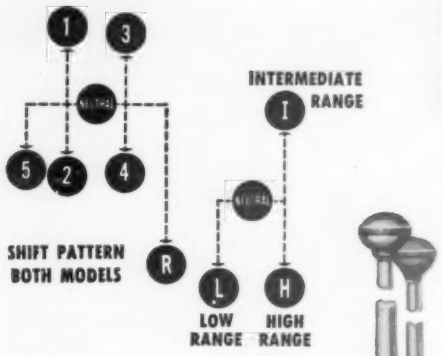
ENGINEERS AND CONSTRUCTORS FOR INDUSTRY THROUGHOUT THE WORLD

385 MADISON AVENUE, NEW YORK 17, N. Y.

NEWARK, N. J. · HOUSTON · WASHINGTON, D. C. · MONTREAL · LONDON · PARIS · THE HAGUE · MADRID

NEW Fuller Heavy-Duty

10 closely-spaced gear splits plus deep reduction ratios



MODEL 15-G-1120

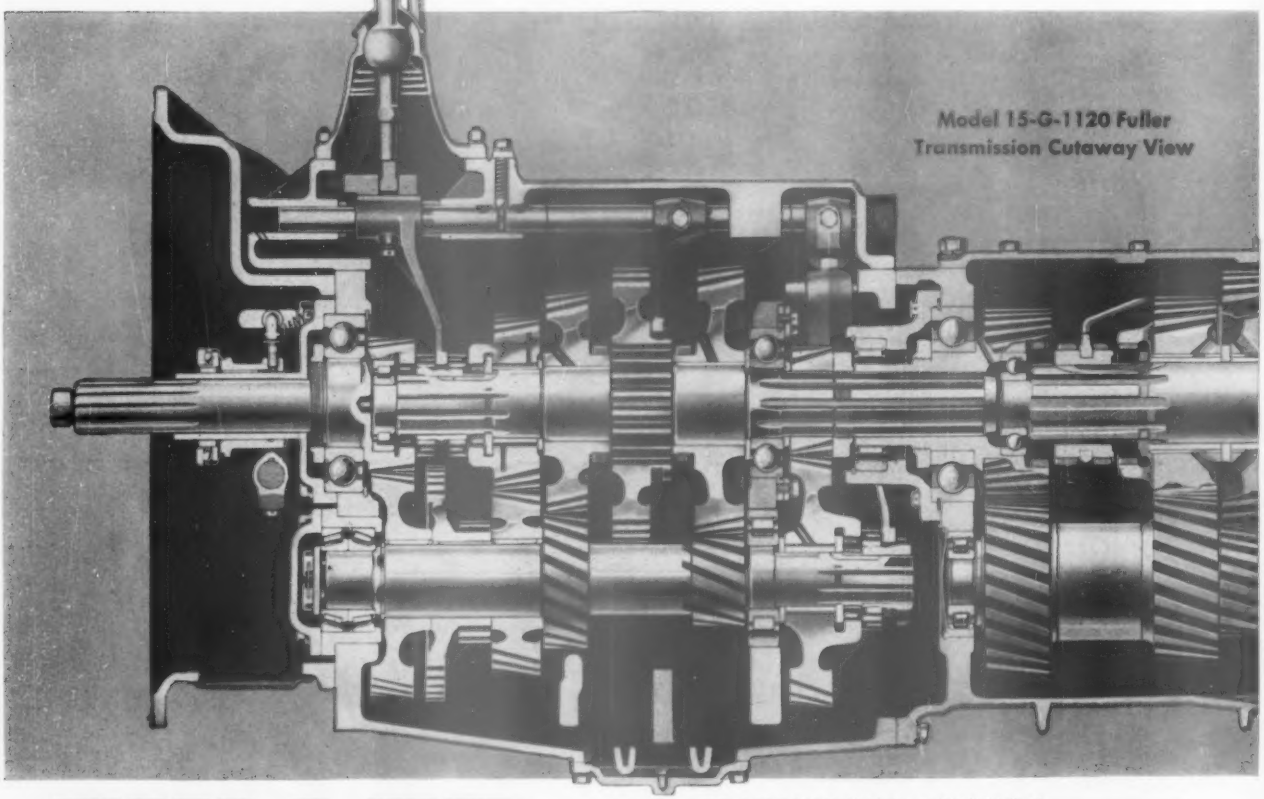
MODEL 15-H-1120

Fuller now offers two new 15-speed transmissions engineered for on and off-highway diesel truck operations demanding high capacity, long wear life and ease of operation . . . for logging, mining, construction, oil-field work, aggregates and ready-mix.

Advantages of the new transmissions include:

1. Extremely short installation dimension, which permits shorter wheelbase for tractors which formerly incorporated main and auxiliary transmissions.

2. Maximum operational flexibility with not only 10 closely-spaced gear splits, but also 5 speeds avail-



Model 15-G-1120 Fuller Transmission Cutaway View

FULLER TRANSMISSION DIVISION MANUFACTURING COMPANY KALAMAZOO, MICHIGAN

Unit Drop Forge Div., Milwaukee 1, Wis. • Shuler Axle Co., Louisville, Ky. (Subsidiary) • Sales & Service, All Products, West. Dist. Branch, Oakland 6, Cal. and Southwest Dist. Office, Tulsa 3, Okla. Automotive Products Company, Ltd., Automotive House, Great Portland Street, London W.1, England, European Representative

15-SPEED TRANSMISSIONS

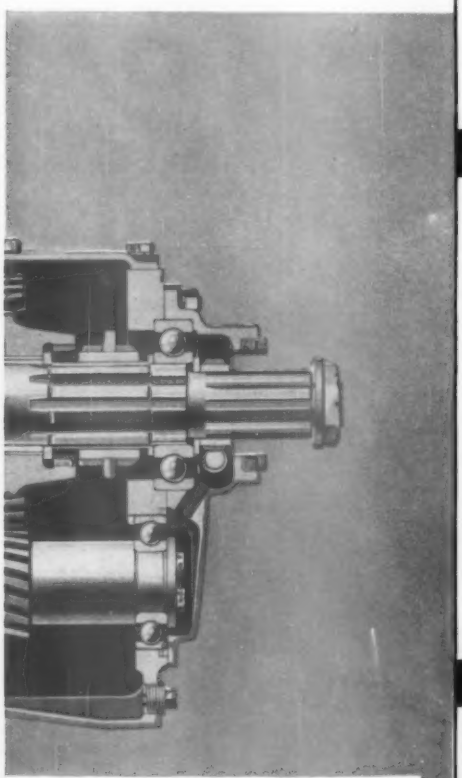
designed for combination on and off-highway applications

able for low range operation through a deep reduction in the auxiliary.

3. A wide choice of optional gear ratios to match every job requirement.

4. Weight reduction obtained by eliminating support brackets, joints, cross members and a propeller shaft.

For full details on the Fuller 15-G-1120 and 15-H-1120 Transmissions, ask your dealer or write Fuller Manufacturing Company.



Subsidiary of EATON Manufacturing Company

Model 15-G-1120: Standard Gear Ratios

SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636		5th-Low	1.33	
			33			
9th	O'Drive-Int.	.844				57
			19			
8th	Direct-High	1.00		4th-Low	2.09	
			33			
7th	Direct-Int.	1.327				76
			32			
6th	3rd-High	1.76		3rd-Low	3.68	
			33			
5th	3rd-Int.	2.32				86
			41			
4th	2nd-High	3.27		2nd-Low	6.83	
			33			
3rd	2nd-Int.	4.33				100
			51			
2nd	1st-High	6.54		1st-Low	13.67	
			33			
1st	1st-Int.	8.68				

Model 15-H-1120: Standard Gear Ratios

SPLITS—OVER-HIGHWAY				LOW RANGE—OFF-HIGHWAY		
Speed	Split	Ratio	% Step	Speed	Ratio	% Step
10th	O'Drive-High	.636		5th-Low	1.68	
			33			
9th	O'Drive-Int.	.844				57
			19			
8th	Direct-High	1.00		4th-Low	2.64	
			33			
7th	Direct-Int.	1.327				76
			32			
6th	3rd-High	1.76		3rd-Low	4.65	
			33			
5th	3rd-Int.	2.32				86
			41			
4th	2nd-High	3.27		2nd-Low	8.63	
			33			
3rd	2nd-Int.	4.33				100
			51			
2nd	1st-High	6.54		1st-Low	17.27	
			33			
1st	1st-Int.	8.68				

Optional Gear Ratios: Models 15-G-1120, 15-H-1120

Overdrive: .85, optional at extra cost
Overdrive: .74
Reverse: 5.06

chemicals on the move...
ethylene glycols
ethanolamines

To give you immediate deliveries, local bulk and drum stocks of the ethylene glycols and ethanolamines are maintained in the Southwest for natural gas processing. At Houston call Ranger Chemical Company; at Odessa and Borger, Texas, or Farmington, N. Mex., call Western Chemical and Supply Company, and at Lafayette, La., call Chemical Service, Inc.

These products are also stocked by distributors in other areas; carload and bulk shipments are made from the Brandenburg, Ky., plant. For the name of your nearest distributor, samples and technical data sheets, see your Olin Mathieson representative or write for complete information.

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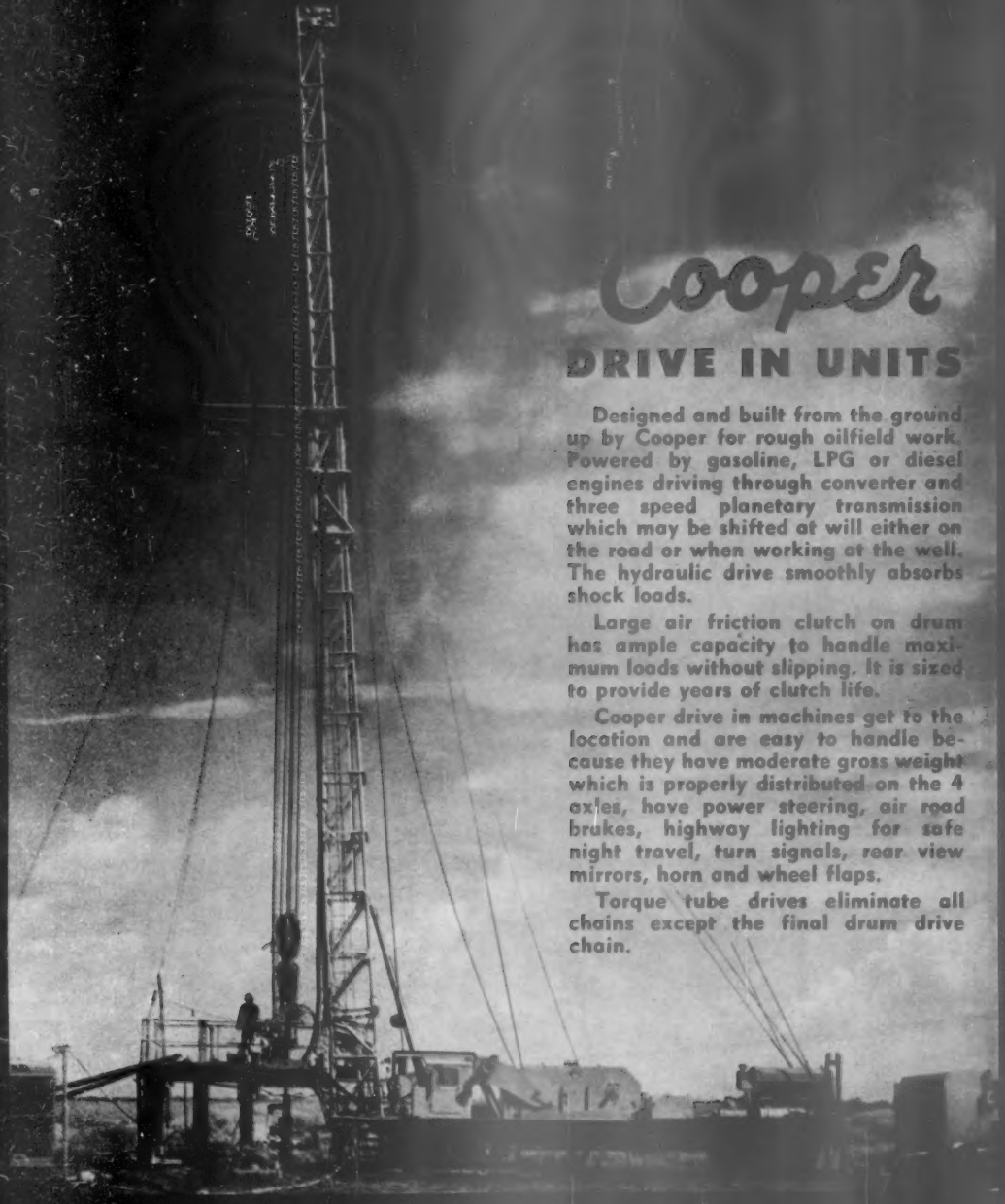

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DRIVE IN UNITS

Designed and built from the ground up by Cooper for rough oilfield work. Powered by gasoline, LPG or diesel engines driving through converter and three speed planetary transmission which may be shifted at will either on the road or when working at the well. The hydraulic drive smoothly absorbs shock loads.

Large air friction clutch on drum has ample capacity to handle maximum loads without slipping. It is sized to provide years of clutch life.

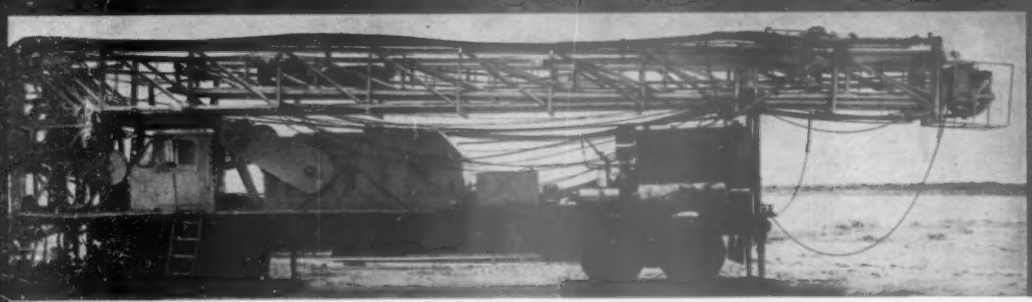
Cooper drive in machines get to the location and are easy to handle because they have moderate gross weight which is properly distributed on the 4 axles, have power steering, air road brakes, highway lighting for safe night travel, turn signals, rear view mirrors, horn and wheel flaps.

Torque tube drives eliminate all chains except the final drum drive chain.

OPTIONAL EQUIPMENT:

- Cooper derricks
- Pole masts
- Rotary drives
- Leveling screws
- Variety of tool box arrangements
- Automatic and plain catheads
- Line guide shells
- Drum dividers
- Auxiliary winches for raising pole masts
- Different platform arrangements

Cooper Drive In Model TD 4210-42 with 96′ Cooper Derrick powered by 275 H.P. LPG engine.



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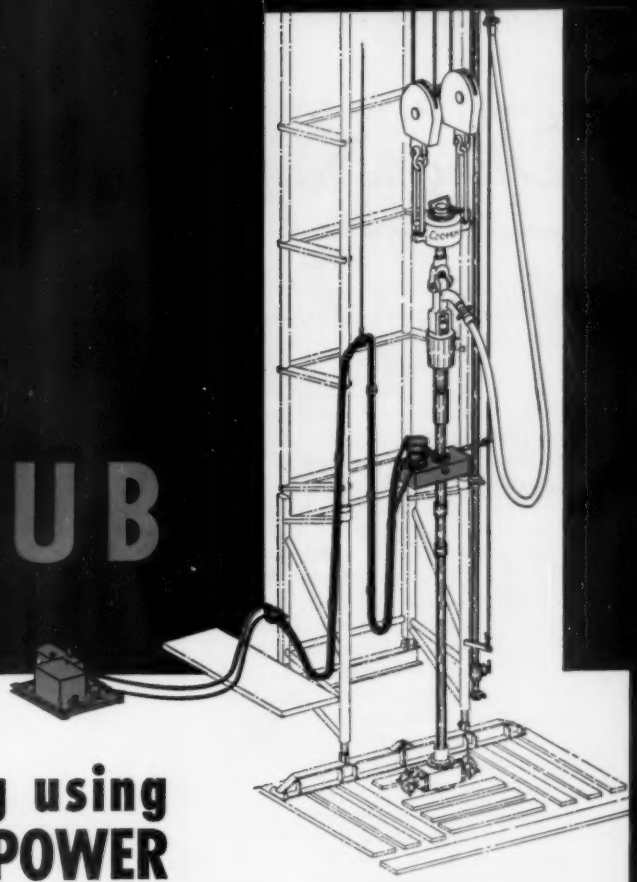
ORIGINATOR OF MOBILE WINCH UNITS

COOPER'S NEW

HYDRA-SUB



rotates the drill string using AVAILABLE HYDRAULIC POWER

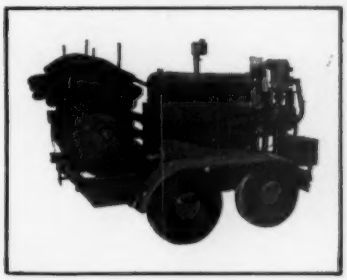
This new tool is designed for drilling and workovers. It is positioned on the drill string just under the swivel and on top of the drill pipe. As the hydraulic power is delivered through hoses the Hydra-Sub is free to move up and down in the derrick. This gives complete flexibility for fishing tool, workover or drilling operations. Rotation with the drill string is prevented by torque arms which travel on stabilizing lines in the derrick. Any standard swivel may be used.

HYDRA-SUB SAVES MORE THAN $2,000.00 OVER CONVENTIONAL ROTARY METHOD

A comparison of costs shows that the model 6030 rated at 30 H.P. which is suitable for most workovers and shallow or slim hole drilling, costs much less and has many advantages over older methods of rotating the drill string. The 6030 operates from most hydraulic systems on derricks or power tool systems.

NOW YOU DON'T NEED Rotary table, kelly, rotary drive sprockets and clutches — drive chains — chain guards or substructures to hold table.

YOU GET Fluid drive eliminating shock loads on drill string — reduces hazards and prolongs life of drill pipe. Accurate predetermined, torque control which protects threads, prevents twist-offs, makes possible continuous coring — has the flexibility for any job. Easily transferred from rig to rig.



Cooper trailer mounted Hydraulic Power Source and Model 6060 Hydra-Sub complete — ready for the road.

COOPER HYDRAULIC POWER SOURCE

Two sizes with hydraulic ratings of 30 H.P. and 60 H.P. Available with connections for other power tools—skid or trailer mounted — Trailer with hydraulic brakes and highway safety equipment — Powered by choice, gasoline, L.P.G. or diesel engines.

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They Say—

Monthly feature expanded

Dear Sir:

I wish to express my appreciation for your willingness to make footage figures available to us on a cumulative basis.

I feel that the inclusion of these figures in your regular monthly round-up table will increase the value and interest in these figures.

Since footage is a better guide to drilling contracting activity than is number of wells, many contractors like to know the amount of footage drilled by areas. In addition, many lines of equipment tie in more closely with footage than with wells. This includes bits, drill pipe, wire line, and even such items as draw works, traveling blocks, etc.

Now that The Oil and Gas Journal will include these in their regular monthly figures, the industry will have footage data available at an earlier date than it has in the past.

Warren L. Baker
Executive Vice President
American Association of
Oilwell Drilling Contractors.

(Editor's note: Beginning with the June 27 issue, the Journal's monthly completion summary will be expanded to include cumulative footage by state for wildcats, total wells, and cumulative wells by state. This expanded summary will appear regularly in the last issue of the month.)

AAPG meeting problem

Dear Sir:

The discussion on the AAPG national meetings (OGJ, May 16, p. 219) was of particular interest to me in my capacity as general chairman of the 1961 meeting in Denver.

In your article you mentioned that the Denver meeting is actually a national meeting replacing a regional. This, however, is not the case. The Denver meeting is being billed as the national meeting of the AAPG, SEPM, and Rocky Mountain section of AAPG. Although the section program will not be held separately, the Rocky Mountain portion of our theme will be expanded to accommodate high caliber section papers.

In addition, the president of the Rocky Mountain section, Orlo E. Childs, will appear on the program during the Tuesday morning general

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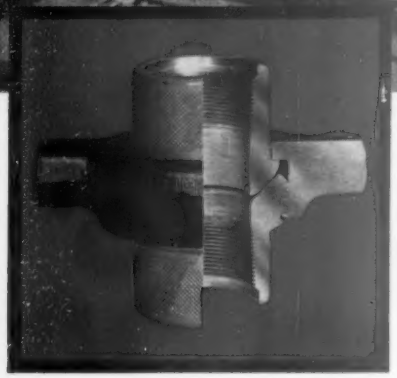

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session along with the presidents of the AAPG and SEPM. Incidentally, our theme for the 1961 meeting is "The Backbone of the Americas—Tectonic History from Pole to Pole."

I think you have done a great service in pointing out this problem and I am suggesting to AAPG President Dr. Ben Parker that a committee be appointed to investigate the problem and make recommendations to the AAPG executive committee on a long-range program for future national meetings.

Laurence Brundell
Geophoto Services Inc.
Denver.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

CALENDAR OF EVENTS

JUNE

22-25 Canadian Gas Association, annual meeting, Manoir Richelieu, Murray Bay, Quebec.

22-25 American Association of Petroleum Landmen, national convention, Ambassador Hotel, Los Angeles.

22-July 1 University of Michigan, engineering summer conference, topics in multiphase flow, Ann Arbor, Mich.

25-29 Petroleum Equipment Suppliers Association, annual meeting, Banff Springs Hotel, Banff, Alta.

25-July 5 First International Congress for Automatic Control, Moscow, USSR.

26-28 North American Gasoline Tax Conference, annual meeting, southern region, Eden Roc Hotel, Miami Beach.

26-July 1 American Society for Testing Materials, annual meeting and exhibit, Chalfonte-Haddon Hall, Atlantic City, N. J.

27-28 Michigan Gas Association, Mackinac Island, Mich.

JULY

11-20 University of Michigan, engineering summer conference, applied mathematics for chemical and metallurgical engineers, Ann Arbor, Mich.

18-29 Massachusetts Institute of Technology, dynamics and control of chemical engineering processes program, Cambridge, Mass.

28-30 American Petroleum Institute, Division of Production, Eastern district meeting, The Greenbrier, White Sulphur, Springs, W. Va.

AUGUST

3-5 Wyoming Geological Association, field trip to Snyder basin and Wind River Mountains, Casper.

14-19 National Congress of Petroleum Retailers, Inc., annual session, Shamrock-Hilton Hotel, Houston.

15-17 American Society of Mechanical Engineers, American Institute of Chemical Engineers, heat transfer conference and exhibit, Statler Hilton Hotel, Buffalo, N. Y.

15-26 Sacramento State College, summer institute on nondestructive testing, Sacramento, Calif.

22-26 Gordon Research Conference, catalysis, Colby Junior College, New London, N. H.

29-31 Appalachian Gas Measurement Short Course, University of West Virginia, Morgantown, W. Va.

30-Sept. 2 American Association for the Advancement of Science, Alaska Division, eleventh Alaskan science conference, Anchorage.

SEPTEMBER

6-7 Chemical Institute of Canada, organic chemistry division conference, Edmonton.

7-9 American Society of Mechanical Engineers, joint automatic control conference, Massachusetts Institute of Technology, Cambridge, Mass.

7-10 Billings Geological Society, annual field trip, Hebgen Lake-Madison Valley area of southwestern Montana.

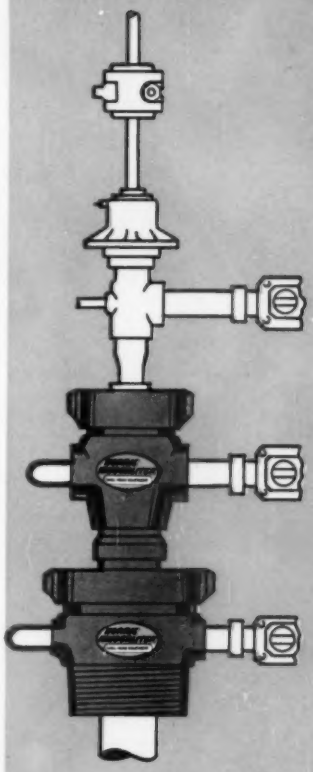
8-9 National Research Council, Chemical Institute of Canada, tenth Canadian high polymer forum, Alpine Inn, Montreal.

8-9 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.

8-10 Chemical Institute of Canada, western regional conference, Regina.

8-10 Intermountain Association of Petroleum Geologists and Eastern Nevada Geological Society, field trip, eco-

Engineered Simplicity



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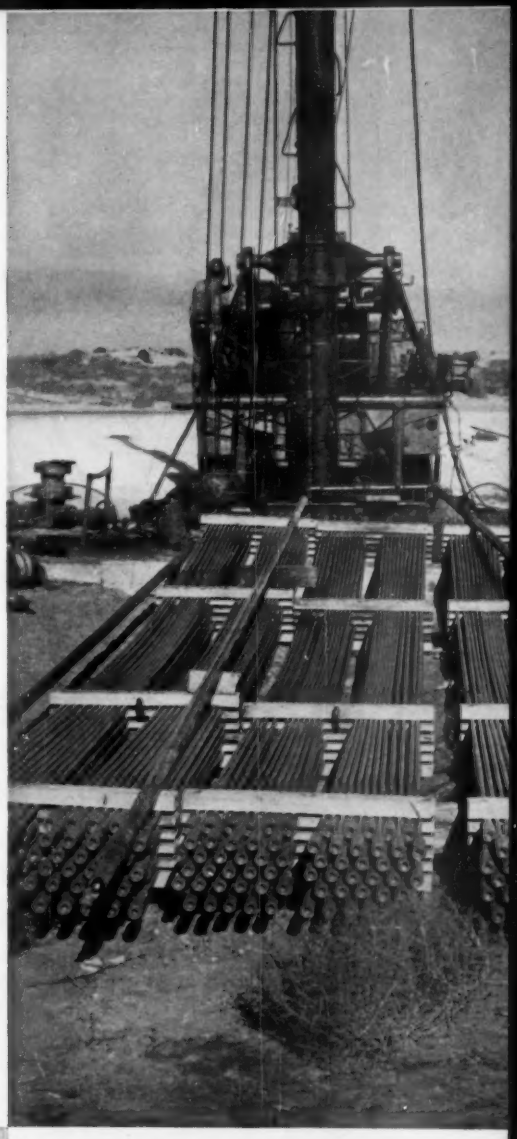

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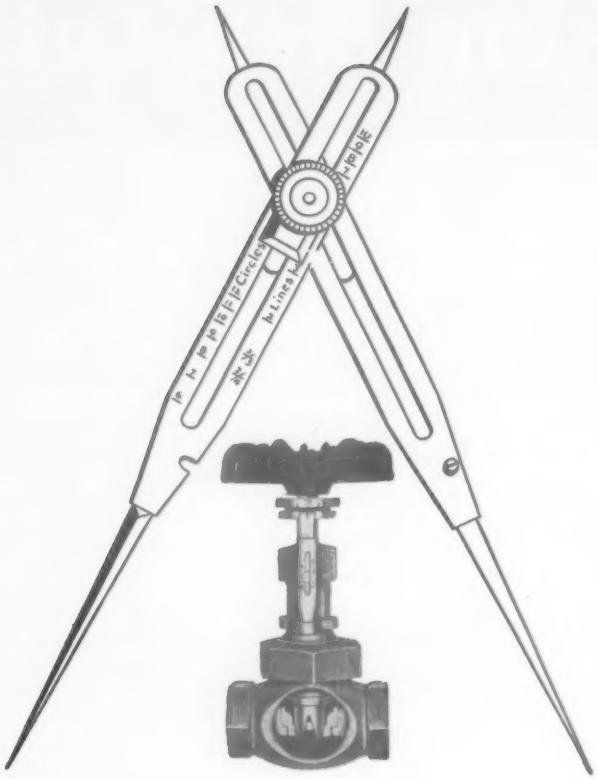

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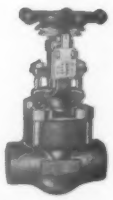
Hancock "Flocontrol" Valves are available in Bronze and Steel to meet the most demanding services. Ask your industrial supply distributor for details.



Hancock "Flocontrol" valves assure positive pinpoint control—eliminate all guesswork.

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nomic geology of east-central Nevada.

11-16 American Chemical Society, national meeting, New York City.

14-15 Western Petroleum Refiners Association, Rocky Mountain regional technical-industrial relations meeting, Henning Hotel, Casper, Wyo.

14-16 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

15 Natural Gasoline Association of America, Rocky Mountain regional meeting, Palliser Hotel, Calgary.

15-16 American Institute of Mining, Metallurgical, and Petroleum Engineers, annual engineering management conference, Morrison Hotel, Chicago.

16-17 Kansas Geological Society, twenty-fifth annual field conference, northeastern Oklahoma, Western Hills Lodge, Wagoner, Okla.

18-21 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Jung Hotel, New Orleans.

19-21 Texas Mid-Continent Oil and Gas Association, annual meeting, Hilton Hotel, San Antonio, Tex.

21-23 Pacific Coast Gas Association, annual meeting, Westward Ho Hotel, Phoenix.

25-27 American Association of Oilwell Drilling Contractors, annual meeting, Roosevelt Hotel, New Orleans.

25-28 American Institute of Chemical Engineers, meeting, Mayo Hotel, Tulsa.

25-28 American Institute of Electrical Engineers, petroleum industry committee, electrical conference of the petroleum industry, Hotel Skirvin, Oklahoma City.

26-29 American Welding Society, fall meeting, Penn-Sheraton Hotel, Pittsburgh.

26-30 Instrument Society of America, instrument-automation conference and exhibit, and fifteenth annual meeting, Coliseum, New York.

29-30 Mid-Continent Oil and Gas Association, Mississippi-Alabama division meeting, Grand Hotel, Point Clear, Ala.

OCTOBER

2-5 Society of Petroleum Engineers of AIME, annual fall meeting, Denver.

3-4 Independent Natural Gas Association of America, annual meeting, Fontainebleau Hotel, Miami Beach.

6-7 National Association of Corrosion Engineers, annual western region conference, Sheraton-Palace Hotel, San Francisco.

6-8 National Association of Corrosion Engineers, southeast region conference, Dinkler-Plaza Hotel, Atlanta, Ga.

6-8 National Academy of Sciences, National Research Council, ninth national clay conference, Purdue University, Lafayette, Ind.

10-12 American Gas Association, annual convention, Atlantic City.

11-14 National Association of Corrosion Engineers, northeast region conference, Prichard Hotel, Huntington, W. Va.

12-14 Southwestern Federation of Geological Societies, annual meeting, Wooten Hotel, Abilene, Tex.

13-14 California Natural Gasoline Association, annual fall meeting, Hotel Miramar, Santa Monica, Calif.

13-16 Taft, Calif., Oildorado, fiftieth anniversary celebration.

17-19 American Society of Mechanical Engineers, American Society of Lubrication Engineers, lubrication conference, Statler Hilton Hotel, Boston.

17-19 University of Minnesota, Pennsylvania State University, Colorado School of Mines, biannual symposium on drilling and blasting, Golden, Colo.

19-20 National Association of Corrosion Engineers, north central region conference, Schroeder Hotel, Milwaukee.

19-21 Gulf Coast Association of Geological Societies, convention, Biloxi, Miss.

19-21 Rocky Mountain Oil and Gas Association, annual convention, Brown Palace Hotel, Denver.

20-21 American Institute of Mining, Metallurgical, and Petroleum Engineers, Los Angeles Basin, fall meeting, Huntington Sheraton Hotel, Pasadena, Calif.

20-23 Odessa Oil Show, Odessa, Tex.

23-25 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

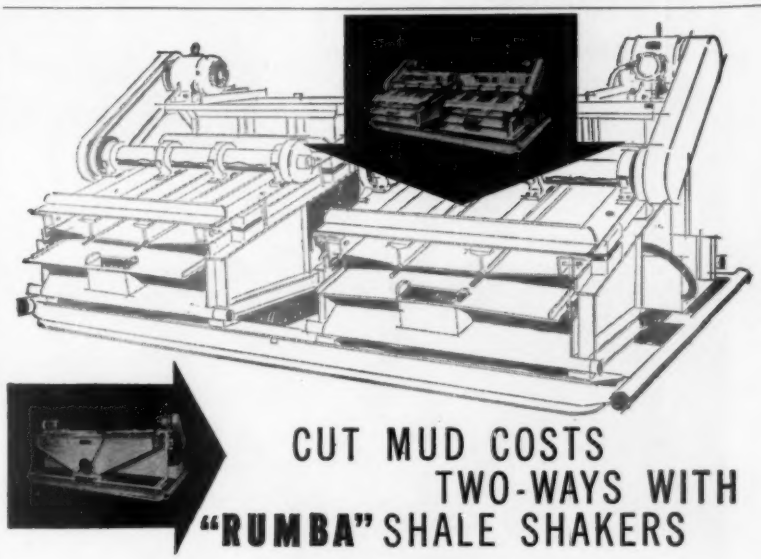
24-25 American Society of Mechanical Engineers, American Institute of Electrical Engineers, fuels conference, Daniel Boone Hotel, Charleston, W. Va.

25-28 National Association of Corrosion Engineers, south central region conference, Mayo Hotel, Tulsa.

26-27 Armour Research Foundation of Illinois Institute of Technology, computer applications symposium, Morrison Hotel, Chicago.

26-27 Western Petroleum Refiners Association, annual question and answer session of refining technology, Rufus Garrett Hotel, El Dorado, Ark.

28 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.



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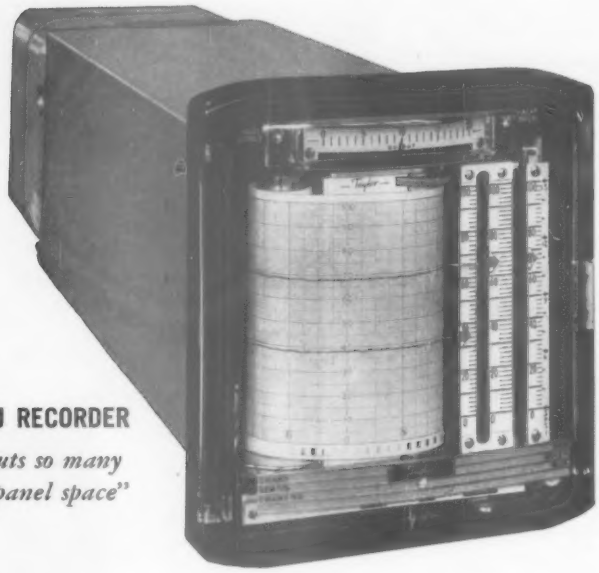
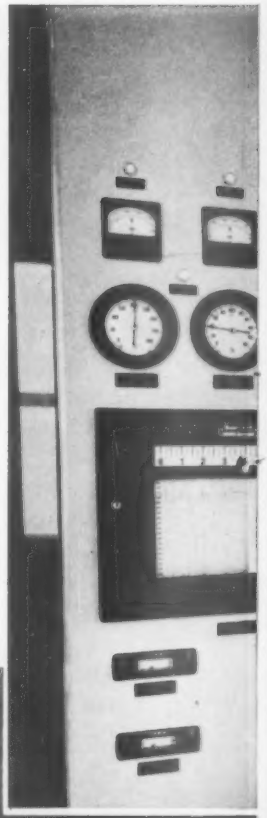


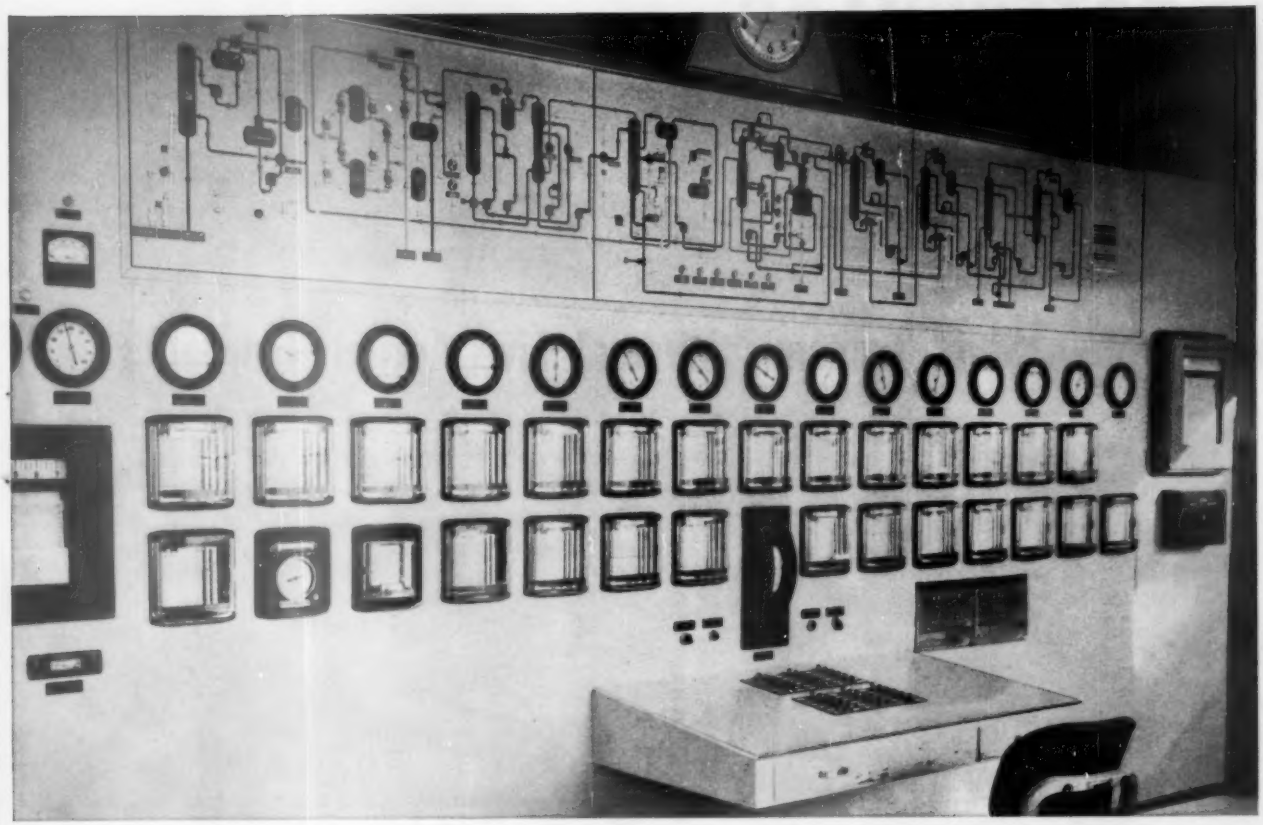
TAYLOR TRANSCOPE 90J RECORDER

"No other recorder puts so many features in so little panel space"



New natural gasoline plant, in the Laverne field of Harper County, Oklahoma, operated by Sun Oil Company.

Taylor Instruments



SUN-OPERATED NATURAL GAS PLANT FULLY AUTOMATED BY TAYLOR

Features most modern semi-graphic panel and TRANSCOPE® instrumentation!

Located in the Laverne field of Harper County, Oklahoma, this Sun Oil Company-operated natural gas processing plant was designed to process 100 million cubic feet of gas per day, for later expansion to 150 million cubic feet. Sun Oil is the operator for itself and eleven other companies. It was built by the J. F. Pritchard Company, of Kansas City, Mo., and is the first of its type in the country to use gas-fired turbines for generating power and process heat.

Taylor flow and temperature transmitters, recorders and controllers are used throughout the highly automated Laverne plant. On the panel shown above, note particularly that the 4" TRANSCOPE (90J) Recorders are extremely compatible with the semi-graphic panel. They give unconfused readability because chart record, pen and set-point are side-by-side. They also assure unprecedented accuracy of records because of servo-operated pen mechanism which provides 150 times greater power than conventional systems.

Sun Oil Company engineers are well pleased with the operation of their Taylor control systems. We are proud to have supplied the instrumentation for one of the world's most modern gasoline plants.

Your Taylor Field Engineer will be glad to demonstrate the many revolutionary features of the TRANSCOPE Recorder. Call him, or write for **Bulletin 98286.** Taylor Instrument Companies, Rochester, New York, or Toronto, Ontario.

MEAN ACCURACY FIRST

CATERPILLAR ANNOUNCES 2 NEW TRAXCAVATORS

with Power Shift Transmission and Live Action Hydraulics

There is a way to beat higher costs—and that's with increased production. For tractor-loader jobs, here's your answer in the new Cat Series H 977 and 955 Traxcavators. Designed to set a pace far faster than the models they replace (and other makes of comparable size), they're milestones in tractor-loader progress. With power shift transmission and Live Action Hydraulics, they're *the loaders that never stop.* Get the facts about them from your Caterpillar Dealer. Ask for a demonstration, too. See for yourself how they set new production figures on the toughest kind of job.

Caterpillar Tractor Co., General Offices, Peoria, Illinois, U.S.A.

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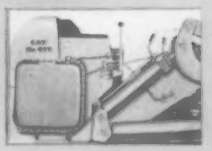
TRAXCAVATORS ARE MAKING OTHER LOADERS OBSOLETE

NEW FEATURES SPEED LOADING, LIFTING, HAULING, DUMPING . . . THE FULL CYCLE

NEW POWER SHIFT TRANSMISSION. One lever—that's right, one lever gives split-second changes in speed or direction to slash cycle times and increase operator efficiency.



NEW LIVE ACTION HYDRAULICS. Provide faster lifting speed and greater lifting capacity without robbing power from the tracks.

MORE HP WITH NEW CAT TURBOCHARGED ENGINE. Up 50% on the 977H—up 43% on the 955H.

NEW INCREASED BUCKET CAPACITY. An 11% increase on the 977H—a 16.6% increase on the 955H.

NEW HEAVY-DUTY UNDERCARRIAGE. Larger, stronger track components also increase stability . . . lifetime lubricated rollers with exclusive floating ring seals need no servicing.

MORE HIGH-PRODUCTION FEATURES. New gasoline starting engine . . . new dry-type air cleaner that cuts maintenance time as much as 75%. Plus such retained features as 40° bucket tilt back . . . automatic bucket positioners and kick out . . . hydraulic track adjusters.

QUICK-CHANGE ATTACHMENTS. Multiply the usefulness of these machines. Attachments available include the Side Dump Bucket, Rock Bucket, Quarry Bucket, Bulldozer, Ripper and Log and Lumber Forks.

JOURNALLY SPEAKING

50 years ago

June 23, 1910

Special trains arranged by Producers Oil Co. brought hundreds of visitors from Shreveport and neighboring communities to booming Caddo field, north of Shreveport, in northwest Louisiana, to see the company's burning oil gusher, its No. 6 Levee Board. The well blew out earlier in the week, cut connections, and caught fire while flowing up to an estimated 20,000 bbl. of oil daily.

Union Oil Co. abandons its famous mile-deep well just off Salt Lake field at Rosemary, Calif. At total depth of 5,760 ft. it is the second-deepest, if not the deepest, test in the world. Drilling took 4 years and cost more than $75,000. Some oil was found at 2,500 ft. but could not be produced economically.

25 years ago

June 20, 1935

Orderly development and operation replaces speculative and random drilling boom and productive confusion in giant East Texas field. New low level reached in estimated illegal (hot) oil production, now under 25,000 bbl. daily.

Booming Fitts area in Pontotoc County, Oklahoma, takes top spot among country's active oil fields. Twelve more big wells completed from field's 4,200-4,300-ft. Bromide sands. Twenty-six new locations staked. Daily output rises to 17,000 bbl. Stanolind Pipe Line Co. lets contracts for additional pipeline outlet.

California oil flood and price concessions alarm nation's industry. State's production climbs above 573,000 bbl. daily to set new record nearly 10,000 bbl. above previous peak late in 1930. Storage facilities overflowing and outlets jammed.

10 years ago

June 22, 1950

Newly formed Marine Gathering Co. announces plans for first offshore gas pipeline to be laid in tidelands waters of Gulf of Mexico. New 8⅝-in. line to connect Pure Oil Co.'s Rollover (Vermilion Block 39) field, 9 miles off the coast of Vermilion Parish, Louisiana, with Tennessee Gas Transmission Co.'s land system. Delivery capacity rated at 50,000,000 cu. ft. daily.

Stockholders of Sunray Oil Corp. and Barnsdall Oil Co. approve merger of the two companies. Ex-Barnsdall officials Dale R. Snow, W. C. Whaley, and D. L. Frawley are named to Sunray's board of directors. Ben L. Young, ex-Barnsdall treasurer, appointed assistant treasurer of Sunray.

Backward, Turn Backward

"We need a volunteer to produce 'The Journal Said' while Neil Williams is on vacation," Lynn Nichols said, looking at me significantly.

In the silence that followed, I felt that I should say something. "Well, my game's presentation, you know."

"You'll find bound copies of The Journal in the library," Nick directed, and that seemed to end the conversation.

In the library I followed the shelves of Journals back through an impressive number of years until I reached half a century ago. As I opened the 1910 edition, I contemplated how things must have changed in 50 years.

My eye immediately fell on this item: "Let some broke wildcatter discover enough oil to color the water or gas enough to singe his whiskers, and the connoisseurs view with alarm the encroachment of capital and scent a conspiracy."

I closed the volume and started to return it to the shelf, assuming I had somehow picked up last year's Journal. But no, another glance showed "1910" gilded on the binding of the book. I opened it again. "Petroleum interests play a shabby genteel part when they appear in public, before state and federal bodies politic, either as applicants for legitimate favors, to ask for rights denied, or to defend assailed estates."

How about that? T h i n g s hadn't changed in 50 years, after all. As I read on, though, I saw that it was only people's thinking that hadn't changed. The news itself had an entirely different flavor. Take a report on progress in communication from a Utah field:

"After July 1, we will have a daily mail from Cortez, Colo., and Mr. Butts, of this place, who has the new contract, contemplates putting on a 60-horsepower auto to carry mail and passengers. This will be a great help, as then it will only be a short trip from the railroad."

The Journal was considerably more folksy then, too. I can picture the expression of an oily-fingered roughneck as he thumbs through The Journal and reads, "On Wednesday, June 1, at the home of the bride's parents in Tulsa, Okla., Mr. Charles Franklin Roeser and Miss Nellie Neves were married, and departed for an extended tour of the east. The g r o o m is a brother of W. H. Roeser, the well-known operator."

The Journal was not above calling a spade a spade. If there was shady work involved, the editor spoke out strongly. "Reports have been coming from Henrietta and Petrolia, Tex., for a week or more that a well of some kind has been struck in the 1,750-ft. sand. The well was drilled for the deep gas sand and after a showing appeared, it was kept pretty quiet. No tankage was up and the hole was not finished until everything was ready."

I thought of the glowing accounts of prospects given by some modern-day oil men about their areas. Not so 50 years ago. An oil man discussing prospects in the McKittrick area of California had this to say: "There is no excitement in this field, nothing to sell, nobody after property, and everybody who is located here is satisfied with the future outlook."

Fashions in dress played their part in the oil news. "W. S. Roberts was killed by being caught in a gas engine on his lease on the late M. B. Sills' farm near Montpelier, Ind. He was wearing a long coat, which caught on the line shaft and drew him until he strangled."

As I finished collecting material for "The Journal Said," I considered how today's Journal is more informative, more authentic, and m o r e clearly aimed at helping the oil man move ahead in his field. Nevertheless, it must have been pretty exciting to open the book 50 years ago and read:

"After a lifetime of wildcatting, George Thomas is willing to drop the romance and settle down to steady production."

They just don't write like that any more.

—Max L. Batchelder

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PETROLEUM CORPORATION

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EXPORT TERMINALS: CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS, SAN PEDRO, CALIF.

Now oil must concern itself with pure air

THE GROWING public alarm over air pollution threatens to involve the oil business in a number of ways—some most unfair—that will cost money and impair community relations.

And not just in Los Angeles, where the smog problem has got national attention and loaded unjustified blame on oil operators.

Many other cities are getting worked up over air pollution and are following the Los Angeles pattern of cracking down on oil first, even though petroleum vapors are an insignificant factor and the local atmospheric conditions could not possibly create real smog.

LOOK WHAT HAPPENED in Louisville, Ky. Refiners and distributors there have about 1,000,000 bbl. of gasoline storage—probably little more than average for an industrial city of that size.

A Public Health Service survey showed that about 6 tons of hydrocarbon vapors daily were escaping from these tanks. Dry cleaning, painting, and other operations were releasing some 90 tons, and automobiles around 200 tons of hydrocarbons.

In Los Angeles' peculiar atmospheric conditions much of the smog is created by chemical reaction of ozone and hydrocarbons. But that couldn't happen in Louisville. Most of Louisville's air pollution came from more than 200 tons a day of sulfur dioxides, acids, and other poisonous gases from industrial plants, plus coal furnaces and trash incinerators.

You can guess where the ax fell. Following Los Angeles' example, Louisville ignored its chief sources of pollution and cracked down on the oil business.

A new ordinance requires vapor-conservation installations on all gasoline tanks of more than 40,000 gal. Petroleum distributors in the city are faced with an expenditure of upwards of $500,000 to comply. And it will have no appreciable effect on the city's air pollution.

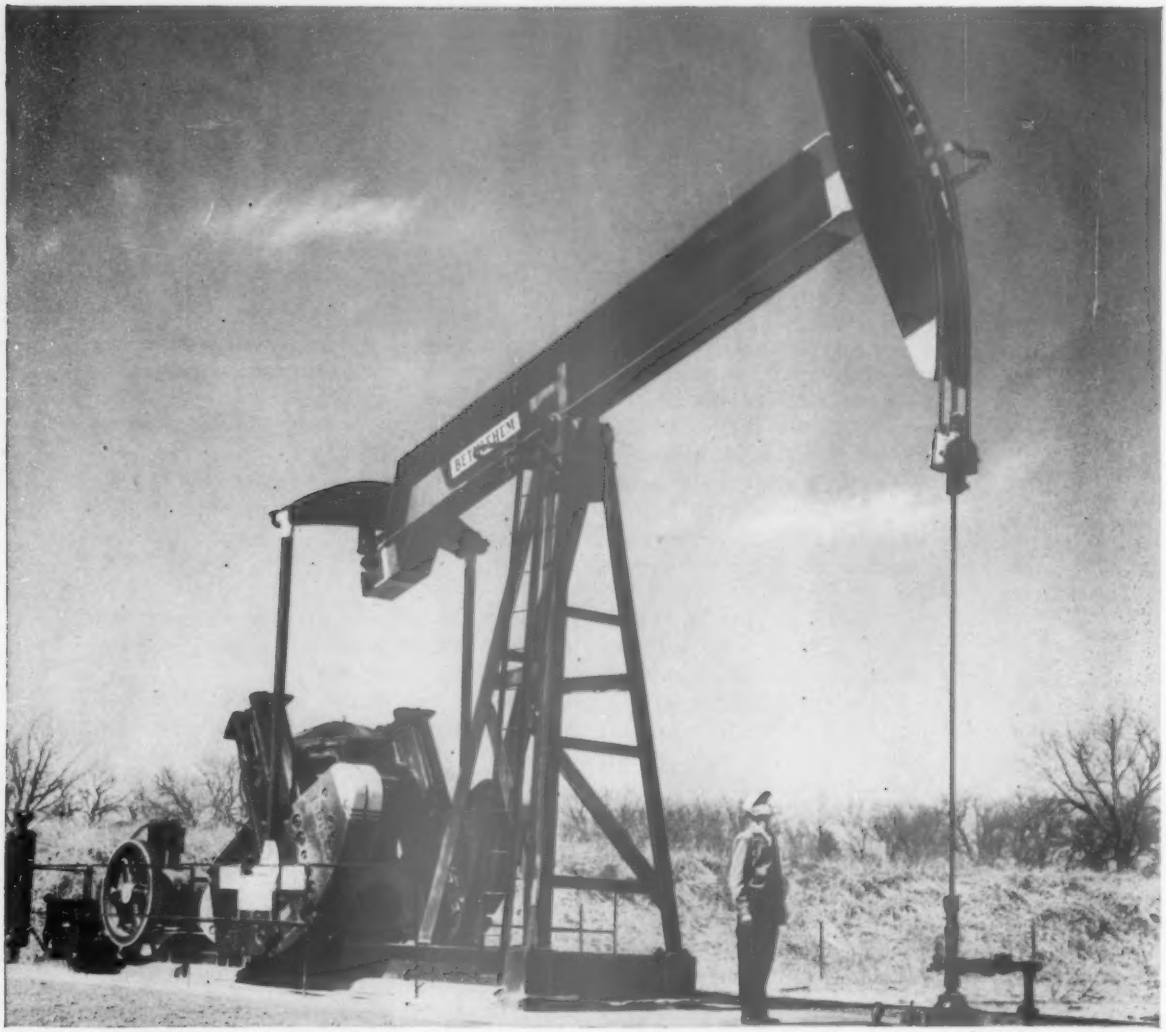
Curiously—or perhaps typically—the oil companies in Louisville took no notice of all the pollution agitation until after the law was passed.

THE PUBLIC HEALTH SERVICE is asking a big annual budget to study air pollution, and wants petroleum and other industries to kick in large sums for research.

Oil should do its share in research and in pollution-control measures—particularly since oil gets more than its share of the blame.

But—as the Louisville incident proves—just getting the facts about air pollution is not enough. There must be an active, local-level participation in each community's approach to the problem.

Here is an example of the need for oil-industry public relations "in depth". A scientific treatise or a few defensive press releases won't get the job done. Unless oil men take an active part in community problems there may be many more Louisville-type incidents.



8185-ft string of nickel alloy steel sucker rods is used in Sun Oil Company well. String is in its fifth year of service. Pumping unit operates at rate of 5 spm, using a 128 inch stroke.

High strength of nickel steel makes for rugged rods

(this string is 5 years old...still going strong!)

The rods in this string were installed over five years ago in the Sun Oil Company's Spargur Heirs No. 1 Well, near Oklahoma City. They've been in steady service ever since, *and are still going strong.*

The secret? They're made of high-strength nickel-chromium-molybdenum steel, normalized and tempered. Sun Oil Company engineers specified this steel because they needed a material that could take the heavy loads of their 8185-ft well.

Nickel-chromium-molybdenum steel is especially designed for equipment that must withstand high stresses, fatigue and shock loads. Sucker rods are also available in a variety of other nickel alloy steels to satisfy particular well conditions and varying production demands.

Do you suspect that your own equipment is not performing as well as it might because of stress, fatigue or corrosion? Then let us know about it. We'll be glad to work with you in finding a solution.

The INTERNATIONAL NICKEL COMPANY, Inc.
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NICKEL MAKES METALS PERFORM BETTER LONGER

Pressure Is Growing on Crude Prices

• Cuts by Ashland, Sohio, and others trim 15 cents off 143,000 bbl. of oil in Illinois basin and Kentucky. Other developments also point the finger at rising output in unprorated states. One good note: Higher gasoline prices.

CRUDE-OIL prices from the Great Lakes to the Gulf are under increased pressure this week as a result of 15-cent cuts in the Illinois basin and Kentucky.

Ashland Oil & Refining Co., which kicked off the reduction, blamed the cuts directly on the lack of proration in the Illinois basin-Kentucky fields.

This immediately focused attention on a growing industry-wide concern over the lack of production controls in some states. As examples:

. . . **The IPAA's** Minor Jameson told the Compact Commission that in the last 4½ years four major producing states have cut production 645,000 bbl. daily while nine others have increased production 570,000 bbl. daily (Next page).

. . . **A new committee** of the Interstate Oil Compact Commission announced it will attempt to develop a yardstick for judging a state's "fair share" of the market.

There was another development in the price-production-proration picture: Producers in Mississippi's McComb field learned they face a shutdown or a 50-cent price cut on July 1 unless they can find other buyers for their oil (p. 75).

The price cuts . . . The big buyers first involved in the reductions were Ashland and Sohio Petroleum Co.

Ashland posted a new base price of $2.85 for Illinois basin crude, off 15 cents from $3, and a base of $2.72 for eastern Kentucky crude, off from $2.87. The reductions involved 75,000 bbl. of daily production—65,000 bbl. in the Illinois basin and 10,000 bbl. in Eastern Kentucky.

Sohio cuts in Illinois, Indiana, and Kentucky involved 40,000 bbl., much of it in Illinois.

The same cuts were announced later by Owensboro-Ashland Co., involving about 5,000 bbl.; Producers Pipeline Co., 5,000 bbl., Pure 21,000 bbl., Sun 4,500 bbl., and Rock Island 2,600 bbl.

The actions quickly put at least 143,000 bbl. daily of the 270,000 bbl. production in the tristate region on lower scales.

It was the first price change for the region since 1957. This has made the area appear most stable in view of the two, and in some cases three, price cuts which have been absorbed by producers in many other fields of the country.

Other buyers in the area include Texaco, Ohio, Shell, Indiana Farm Bureau Co-op, and Humble.

An explanation . . . Ashland President Everett F. Wells gave a detailed analysis of his company's market position in explaining the cuts to Kentucky and Illinois producers.

He blamed the depressed crude market to flush Green County, Ky., production and lack of proration in the whole area.

He said prices have been under heavy pressure since last year when Ashland had to provide "an orderly market for more than 50,000 bbl. daily of new production from Green County."

Ashland did this by terminating contracts for crude from the west but began restoring these when Green County production started declining. For the last 5 months, Wells said, Green County has held steady and pipeline runs from other areas in Kentucky and the Illinois basin have been increasing unexpectedly.

"Since these producing areas do not have the benefit of proration laws to control crude-oil production," Wells said, Ashland tried to expand the market for the oil so as to keep it in balance with production.

Wells said Ashland resold about 25,000 bbl. daily of Illinois basin oil and put about 12,000 bbl. daily into inventory. The company now has over 5,000,000 bbl. of oil on hand and is running out of storage. Even an offer to sell a million barrels of spot oil at a 10-cent discount failed to get a buyer among refiners in seven states.

Wells said the Illinois basin market has been undercut by crude from the Rockies, Michigan, and Canada. New pipelines also are moving refined products from the Gulf, East Coast, and Mid-Continent into markets served by refiners of Illinois basin crude.

Wells concluded: "In the absence of proration laws, the only way to hold production down to market demand is through pipeline proration, which we believe is impractical in these fields where there are many waterflood projects.

"There appears to be no alternative except to post a more realistic price for Illinois basin crude oil, hoping thereby to find an adequate market."

IPAA hopeful . . . Alvin C. Hope, IPAA president, expressed the hope that buyers would reconsider the cuts.

Further deterioration in prices would undermine producers' efforts to find and develop sufficient reserves.

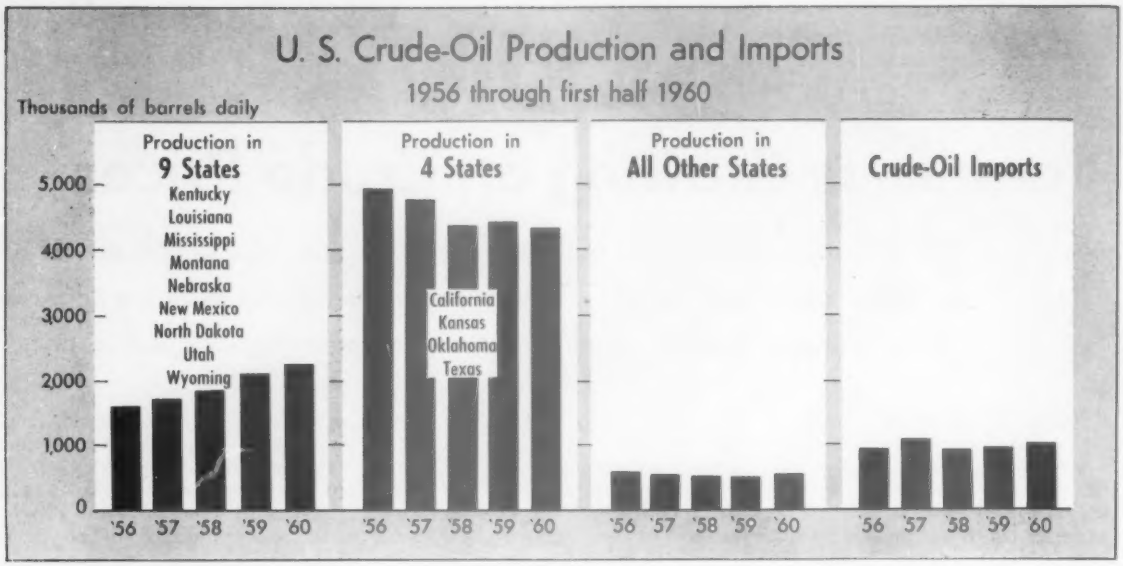
The cuts came, he said, at a time when there was some evidence that improved product prices would correct conditions ultimately affecting crude prices.

Chief concern of many other oil men, however, was a possible spread of the cuts to other producing regions. Crude from the Rockies, the Mid-Continent, and West Texas competes with Tri-State oil and will be under pressure if the cuts hold.

Derby fight quiet . . . The squabble in Kansas between Derby Refining Co. and central Kansas producers settled down to a legal jousting bout last week.

Derby appealed to district court in Wichita from an order of the Kansas Corporation Commission shutting in 40 fields in central Kansas supplying Derby with oil. No date has been set for hearing the appeal.

So far no other buyer has met Derby's reduced postings, but developments in the Illinois basin may change this.



Unequal Proration Among States Questioned

FOUR oil-prorated states have borne the brunt of cutting back production in the last 4 years to balance a demand pattern that has shown hardly any increase.

Nine other states, however, have greatly increased production.

Supply from the rest of the states and from imports has remained practically constant.

This disparity was pointed out last week by Minor S. Jameson, Jr., executive vice president of the Independent Petroleum Association of America, in a talk before the Interstate Oil Compact Commission in Detroit.

Jameson said the facts "pose the serious problem of adjusting conservation activities, import controls, and industry operations to a more moderate rate of growth in the total demand for crude oil."

Jameson outlined this series of events:

Crude-oil production in nine states—Kentucky, Louisiana, Mississippi, Montana, Nebraska, New Mexico, North Dakota, Utah, and Wyoming—increased by 570,000 bbl. daily from 1956 to 1960.

Crude-oil imports increased by 65,000 bbl. daily.

With no change in total demand for crude oil, total supply during the first 6 months of 1960 was about the same as in 1956.

Increases, therefore, were offset by decreased production in other states. Four states—California, Kansas, Oklahoma, and Texas—accounted for 645,000 bbl. daily of the reduction.

He observed "there is an obvious and important difference between sharing a growing market and attempting to grow in a static market."

The IPAA executive declared that while total demand for crude oil remained static in the last 4 years consumption of petroleum products increased on the average of 180,000 bbl. daily per year.

He attributed this disparity of crude-oil demand to a maladjustment of inventories, greater yields of light ends from crude, increased output of natural-gas liquids, and increase in imports of products other than residual.

His predictions: U. S. oil consumption will continue to increase—by about 3% per year over the next 5 years. Higher light-end yields and increased production of natural-gas liquids will continue to supply part of increased consumption of products. Inventory maladjustment and import volumes should remain constant.

Compact Will Study Uniform-Proration Idea

UNIFORM state action to curtail crude production to the needs of the national market may never be achieved, but the subject is no longer taboo for the Interstate Oil Compact Commission.

More market-demand proration and equitable division of output among the states was the hottest topic at the Detroit meeting of the IOCC.

This was quite a switch. Last December the IOCC tabled a motion to study the matter. The growing crude-producing capacity could not be ignored, however, and last spring the executive committee created a new committee on "equality of opportunity of oil production by the soverign producing states."

No action was taken, but an overflow crowd at the organizational meeting of this committee offered a raft of suggestions. The committee announced its intention of attempting to develop a yardstick for judging a state's "fair share" of the market and asked all interested parties to submit ideas. It will meet again on call of the chairman, probably within 60 days.

Hot topic . . . The proration issue popped up in one form or another in almost every session of the 3-day meeting.

Representatives of states without market-demand statutes expressed considerable resistance to any attempt to force them to curtail output. Others raised the fear that too much uniformity in proration might invite federal control.

But all agreed to study the subject, recognizing that IOCC has no power to do anything but make recommendations.

More clearly than ever before, the Compact meeting laid before responsible state officials the continuing problem of oversupply of crude and the rivalries of the states in attempting to obtain a large piece of a virtually static market.

Some are restive . . . Representatives of Texas, Oklahoma, and Kansas made no bones of their feeling tired at being the industry's balance wheel.

These states have applied market-demand proration most severely, and their spokesmen say they are no longer able to carry the burden alone.

A thinly veiled warning was voiced by Chairman Ray C. Jones of the Oklahoma Corporation Commission:

"I don't mind telling you that down in Oklahoma the Indians are getting restless. They are about to get off the reservation.

"They cannot understand why five or six states should bear the brunt of keeping production within market demand, and I don't mind telling you I have about run out of answers.

"Oklahoma is now prorated down to where it is unprofitable to explore for new reserves. The payout is too long, and the bankers won't lend the money. Tax dollars are gradually becoming a thing of the past. Texas is in the same shape, if not worse.

"I am of the firm opinion that without a strong market-demand statute, you have no conservation program.

"We have been coming to these meetings for, lo these many years and preaching conservation and yelling hurrah for hurray, but I am beginning to wonder just how much we have accomplished."

The other side . . . A quite opposite view was presented by Chairman C. R. Henderson of the Utah Oil & Gas Conservation Commission. He explained that his state has a law expressly prohibiting proration to market demand, saying:

"The people of Utah would stand up and rebel against any group that came into the state and suggested that, for conservation reasons, we must close down our wells or even restrict them to the level of production of these states that are still drilling unnecessary wells for allowable or those which are drilling over half their wells on less than 20-acre spacing."

Nevertheless, at the "equality committee" meeting, Henderson recognized the problem of national overproduction. He made the motion that the committee pursue its studies actively and meet again soon.

A plan . . . Suggestions were made for a formula for a state's fair share of the market.

Several said this should be based on such things as reserves, productive capacity, number of wells, proportion of proratable as against exempt wells, historical pipeline and refining patterns, and a state's consumption with relation to its production.

Most vocal was Paul R. Schultz, president of the Oklahoma Independent Petroleum Association, who insisted that no one factor would be sufficient. He suggested they all be listed and weighted, as in a formula for a unit operation.

If the IOCC had some sort of a yardstick, Schultz said, each state could see where it stands in relation to the others and could independently work out its own method of market-demand proration. This need not be strictly in conformity with any formula so long as all states stay more or less in line with national market conditions.

Schultz warned, "if about four states can't carry the load any longer and the other states won't help, we face federal proration. Then each state will be put on a rigid formula. You had better give this problem serious consideration or someone else will."

Schultz promised to present a full study within a few weeks through the liaison group of state producer associations.

McComb Field Faces Shutdown

. . . or a 50-cent cut on July 1. Producers are looking for buyers, but high trucking costs discourage prospects.

MISSISSIPPI's McComb field faces a shutdown July 1 unless producers are willing to take a cut of 50 cents a barrel and sell their crude on the open market.

The field is less than a year old and once boasted production of 7,500 bbl. daily.

Now the search is on for regular buyers at the posted price of $3.25. But persons familiar with conditions haven't much hope at this time that buyers will be found.

Esso division of Humble Oil & Refining Co. is the only buyer in the field and has announced it will quit taking its 5,000 bbl. daily July 1. It cut purchases March 1 from 7,500 bbl. to 5,000.

Esso did not say why, but others point out that McComb is the largest and newest field in Mississippi where crude must be trucked out. The crude is trucked 20 miles to the Interstate Pipe Line Co.'s Liberty station for movement to Esso's Baton Rouge refinery.

Esso currently is taking about 60% of Mississippi's 132,500 bbl. of crude daily and has been prorating 15% since March 1 throughout the state.

McComb field was brought in only last August and was quickly developed with more than 100 wells (OGJ, Feb. 29, p. 44). The biggest drilling occurred in the first 2 months of this year, but this quickly slowed to a standstill when Esso made its March 1 cutback.

Solutions lacking . . . Sun Oil Co., with 2,000 bbl., is by far McComb's largest producer.

The other producers, generally smaller independents, last week were waiting for Sun to take the lead in finding a market and avoiding a shutdown.

Sun's Dallas office said it was taking steps "to salvage the situation" but is still undecided on what to do.

The producers have received offers to move the crude, as before, by truck and Interstate's lines to Baton Rouge, and then to barge it onto the open market. This, however, means a 50-cent cut.

Another solution to the problem is to construct a crude line into the field to connect with Interstate, but no one has stepped forward to do it.

Another possibility is that Sun, itself, will buy a portion of the crude.

Proration problem . . . The crisis in McComb field produced discussion in Mississippi last week that the State Oil & Gas Board should rely more on market demand in fixing allowables for the state. Allowables are based primarily on the maximum efficient rate of production.

However, the board had already cut back McComb production from an average of 300 bbl. daily per well through February to 150 bbl. on March 1. Then, after Esso made its 2,500-bbl. cutback, the allowable was cut again to 65 bbl.

One industry official said the condition in the field, coupled with the soft crude market, may bring action.

"Mississippi is out of line on production," he said. "It sets allowables on MER while other states are on market demand. That really gets down to the problem we have. This McComb field thing might help lead to something."

L. F. McCOLLUM, standing, addressing Washington press conference.

Oil's Export Outlook Dull

. . . Continental president reports after European study. Best prospect at the moment: Petrochemicals.

THE CHIEF HOPE the oil industry has of increasing exports lies in petrochemicals, Leonard F. McCollum, president of Continental Oil Co., said in Washington last week.

McCollum has just returned from a tour of Europe as chairman of a special National Export Expansion Committee appointed by the U. S. Department of Commerce to help stimulate exportation of U. S. goods as one means of stimulating the American economy.

McCollum thinks there is a considerable potential for many U. S. industries and businesses, particularly for consumer goods in some areas and machine tools in others.

But the outlook for oil is not bright.

McCollum feels there is little likelihood that the U. S. can recapture the overseas markets for oil-specialty products that it lost in the postwar years when the U. S. was encouraging the development of such industries in European nations as a part of their rehabilitation programs.

Even the present potential market for petrochemicals may disappear in the years ahead as more petrochemical plants are built in Europe and in other areas abroad, McCollum said.

When this occurs, about the only "commodities" left for the U. S. oil industry to export will be technical know-how and capital.

McCollum did indicate that his committee will make a study of U. S. military oil purchases abroad (together with other military purchases) to determine whether it should recommend that more of these purchases be made of American goods. This might open an overseas avenue for some U. S. oil products.

Taxes rose more than sales did in 1959

U. S. MOTORISTS paid more than $3¼ billion in state motor-fuel taxes in 1959.

This boosted total state highway-user taxes to more than $5 billion last year, an increase of 8.3% over 1958. (In addition to fuel taxes, other highway-user taxes include vehicle registration fees and other vehicle and carrier fees.)

The increase in state taxes on motor fuels increased faster than the use of those fuels. The U. S. Department of Commerce, which released the statistics last week, said the total taxed last year—57 billion gallons—was only 4.8% more than the quantity taxed the previous year.

The department also noted that not all highway-user taxes are spent on highways.

High court reverses favored-nation ruling

THE U. S. Supreme Court last week reversed a lower court ruling which would have given Shell Oil Co. a gas-price increase under a most-favored-nation clause.

This was the situation:

Shell had a contract with Texas Gas Transmission Corp. under which Shell would get a price increase if the pipeline company paid a higher price to another supplier in Louisiana.

Two years after the 1951 contract was made, Texas Gas did give a higher price to another supplier under a contract which provided for a price redetermination every 5 years.

Shell promptly sought the same price, but the Federal Power Commission ruled that the redetermined price was not a new one which would justify a price hike under Shell's favored-nation contract clause with Texas Gas.

A circuit court reversed the FPC and the case went to the Supreme Court, which in turn reversed the appeals court and sent the case back to that court.

Coal is pushing hard for fuel-policy study

THE NATIONAL Coal Policy Conference has launched an aggressive advertising campaign in an apparent last-minute effort to win public support for its drive to get Congress to set up a special committee to make a national fuels-policy study.

Last week the group had full-page ads in the New York Times, the Washington Post, the Washington Star, and other papers.

Meanwhile, in Congress, efforts were being made to spring a fuels-policy resolution from the House rules committee, where it was recently shelved by a 6-6 vote.

The ad pointed to problems facing coal, oil, gas, railroads and electric utilities and said that a solution for these—as well as the nation's defense—requires a "sound" national fuels policy.

In an obvious reply to the charge

of some oil industry officials that coal is pressing for end-use controls of fuels, the ad said that the study it is proposing would take at least 2 years and that "it is, therefore, unthinkable that anyone could suggest at this time what substantive provisions might or might not be included in the final statement of policy."

Most of the jabs in the ad were aimed at "giant international oil importing companies."

Bureau of Mines sees doubled demand in '75

THE BUREAU OF MINES has just published a new edition of its one-volume encyclopedia on U. S. minerals, nonmetals, and mineral fuels—including gas and oil.

It is an updated version of a similar work done in 1956.

The 1,016 page book contains a 52-page chapter on petroleum and natural gas, including some basic information about the industry, some history, a section on oil's outlook, and one on oil's problems. In the outlook section, the bureau's petroleum writers call particular attention to the fact that the Middle East is now the center of the world's oil reserves.

Other "outlooks" include a continued rise in petrochemical production and a rapid climb in natural gas use.

It foresees a doubling of world oil demand by 1975, with the U. S. demand rising from 9.1 million barrels daily in 1958 to 17 million barrels daily in 1975.

It expects natural-gas prices to continue to rise for some time but says that the "near" prospect for petroleum price increases appears "indeterminate."

Although generally optimistic in tone, the oil chapter does list a number of problems facing the industry.

The biggest problem for the domestic industry "is the need to find and produce oil at cost competitive with the price of foreign oil laid down in this country."

In addition to oil and gas, the book covers the mineral and metals field from alumina to zirconium. Each chapter includes a history, an outlook, and problems.

The book, Bulletin 585, "Mineral Facts and Problems, 1960 Edition," may be bought from the Government Printing Office, Washington 25, D.C. Price is $6 a copy. However, if you want only the chapter on petroleum and natural gas, you may obtain that for 20 cents.

watching WASHINGTON

Clyde La Motte

• Annual political shell game is under way . . .

WATCH FOR political trade-outs and other maneuvers now that Congress is nearing the end of its current session and the party conventions lie just ahead.

Such a situation is an ideal setting for last-minute "deals" on someone's pet legislation or on a plank in the party platform.

For oil, the annual attack on percentage depletion is likely to develop on the floor of the Senate in the coming week—unless the issue is disposed of in cloakroom arrangements.

Senate critics of percentage depletion are trying to wrap up an attractive legislative package which would include a depletion cut. The strategy, obviously, is to garner more votes for a cut than could be obtained if percentage depletion were the only issue being voted on.

Note, for example, how Sen. John Williams (R.-Del.) is baiting the trap:

Williams has proposed that the top income tax bracket be trimmed to a maximum of 60%. To offset this loss to the treasury, he would trim percentage depletion from 27.5% to 22.5%. But he would leave the depletion figure at 27.5% for the small producers—those grossing less than $1 million annually.

Williams attempted to get his proposal attached to a bill being considered by the Senate Finance Committee. He lost, but the vote was close and he said he would try again on the floor of the Senate.

Washington observers don't feel that the Williams move has a chance of succeeding, but it would be a mistake for the industry to ignore the threat.

• Will party platforms include an oil plank? . . .

THE INDUSTRY has a stake in the party platforms, which will be shaped up just before the conventions, even though oil is not expected to be a major issue in either party.

Texas Republicans are pressing for two oil planks in the GOP platform: Natural-gas legislation and continued support of the 27.5% percentage depletion provision.

The Democratic platform may be less specific. None of the leading candidates (unless Hubert Humphrey can be classified in that category) wants to put oil issues in the forefront.

Sen. John F. Kennedy, who once voted against a cut from 27.5% to 15% but who voted for a graduated reduction, probably would quietly oppose a definite stand in the party platform. (However, he has gone on record favoring coal's pet project—a fuels-policy study.)

Sen. Lyndon B. Johnson is equally reluctant to see oil made an issue. While he makes no secret of his support of percentage depletion, he is trying hard to shake any idea that he is a "regional" candidate. Too, his opponents would welcome an opportunity to label him as a friend of the oil industry.

• Johnson makes no apology for oil depletion . . .

In tours he has been making to various regions of the country, Johnson is frequently questioned about his oil views—particularly about percentage depletion. Frequently these questions are asked by a reporter from an anti-oil paper.

Johnson, in reply, usually points out that Congress approved percentage depletion long before he arrived in Washington. Then he adds that in his view it has helped provide the nation with an ample supply of oil at reasonable prices, and that he foresees no need for any change.

A JOURNAL
Panel Interview

The status of oil has changed and is changing. It is the job of security analysts to watch and evaluate the changes and to determine their effect on security values.

Corporations have a high regard for security analysts since their recommendations are an important influence on investors. Their access to intimate, and often confidential, company information enables them to size up a company and an industry in a highly critical manner.

Analysts pictured here represent well-known New York financial houses. All are specialists in petroleum. Moderator of the panel is Edgar R. Everitt, of Kidder, Peabody & Co., and president, Oil Analysts Group of New York. Members are Charles W. Haynie, of Carl M. Loeb Rhoades & Co., Carl Hess, of Dominick & Dominick, Edmund G McElroy, of Brown Brothers Harriman & Co., and Leslie E. Fourton, of Hayden Stone & Co.

Edgar R. Everitt
. . . He asked the questions.

Charles W. Haynie
. . . For the average, a dull outlook.

Five Security Analysts

"Oil is gradually meeting its problems, its

Everitt: We are here to answer a broad list of questions about the oil industry. Since we are not in the industry, these answers may be more objective than those from oil men themselves. It is the earnest hope of this group that this look at the industry from the outside will be of value to those of you who are on the inside. My first question is:

Do you think oils will regain their position as the first choice of investors?

Fourton: This does not appear likely in the foreseeable future. The industry appears to have reached a maturity in size which may have signaled an end to opportunities for spectacular growth. Moreover, a large industry cannot be ignored politically, and it may be well for investors to reclassify the oils as semiutility-type operations, primarily attractive for income.

Furthermore, growth may be hampered also by development of many new competitive fuels and by changes in consumer requirements. In view of this, it is difficult to find a sound basis for believing that the oils may again be rated as the No. 1 choice of investors.

Everitt: Do you regard domestic integrated companies which produce more than 50% of their refineries' crude-oil requirements as better investments than the crude-oil-deficit companies?

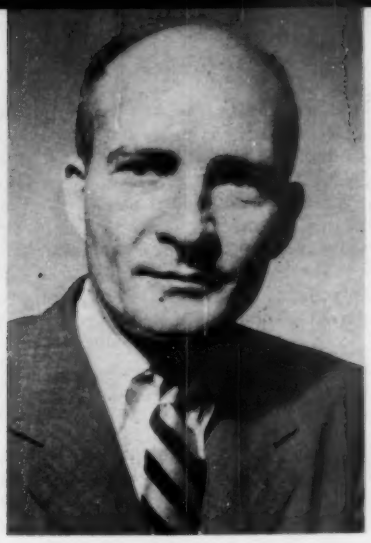
Haynie: Yes I do. Provided, of course, these companies have sufficient reserves and a good acreage position in areas still undeveloped. Profits are still largely derived from producing operations. In addition, a higher self-sufficiency ratio provides more stability to an oil company's earnings.

Everitt: What do you regard as the best asset today of an integrated oil company?

Hess: This is a difficult question to answer in one word. For any company, of course, a well-qualified and aggressive management is an extremely important asset. However, I would say that possession of a well-balanced, fully integrated position in crude production, refining capacity, and controlled marketing outlets, plus ownership or access to an area with a favorable political climate would place such a company in a good competitive position, providing it with a better-than-average degree of stability and flexibility in its operations and, at the same time, enabling the company to capitalize to the maximum extent on the anticipated future growth of the industry.

Carl Hess
. . . Fingers crossed on refinery runs.

Edmund G. McElroy
. . . Tanker rates are pressing prices.



Leslie E. Fourton
. . . No improvement in earnings soon.

Feel Oil's Pulse, Size up Its Health

position is improving, its stocks are a sound long-term investment"

Everitt: What, in your opinion, is the immediate outlook for the purely producing companies?

Haynie: The near-term outlook for the average domestic oil producer without captive markets is rather dull. Corrections in product inventories require continued restrictions in oil production. Furthermore, no increases in crude-oil prices are likely to come for some time.

Everitt: How do you view the immediate future for the major U. S. integrated companies?

Hess: With considerable excess refining capacity in existence, refiners over the past several years have consistently overrun in relation to demand for petroleum products. The result has been that refined-product prices and profit margins have declined to historically low levels.

It will be 2 or 3 years before a substantial part of this excess refining capacity is absorbed through the normal growth of oil demand. In the meantime, the recovery of product prices and profit margins will depend to a large extent upon the ability of refiners to gage operations in line with oil demand.

I believe that over the next few years many of the integrated refiners will further improve their competitive positions and achieve greater efficiency. More and more independent crude producers and marketers will be absorbed by the larger integrated oil companies in order to attain a fuller degree of integration. Thus, refining and marketing may become less competitive, although antitrust authorities are likely to prevent the merger trend from going too far.

Everitt: What's the outlook for the big internationals?

McElroy: In my judgment, the long-term outlook is favorable. The current unfavorable attitude of investors toward these stocks overemphasizes the world oil surplus, the impact of new sources of supply on foreign markets, increased competition, and the political risks usually associated with operations abroad.

While these are very real problems, present pessimism fails to give proper weight to other factors which have favorable implications. These include (1) the recent downward adjustment of the production potential of the French Sahara; (2) the more favorable political climate in the Middle East, where the pressure to expand output to excessive levels relative to market requirements has been greatly lessened by development of new sources of supply west of Suez; (3) the continuing marked expansion in foreign petroleum demand, particularly in the Eastern Hemisphere where a projected annual growth rate of 8% over the next 5 years seems likely to absorb anticipated new production from North Africa and still leave some room for further growth in output from the older producing areas.

In spite of political and economic pressures to develop new sources of supply as rapidly as possible, such output seems likely to move to market without serious dislocation of the price structure. In short, it does not seem likely that the oil industry will continue to make large capital expenditures to expand production unless an adequate return can be realized. This is in line with the announced intention of Standard Oil Co. (N. J.) to operate in the future with much smaller spare capacity.

While developments in Venezuela over the past 2 years have sharply curtailed profits from operations in this area, the Eastern Hemisphere earnings of most large international oil companies are far more important than profits derived from the Western Hemisphere outside the United States. Eastern Hemisphere profits, which declined from the preceding year 20% in 1958, recovered last year to within 9% of the record 1957 level in spite of the world oil surplus and lower prices for crude oil and refined products in many markets.

Everitt: Oil companies are going into petrochemicals in a big way. Will this have an important bearing on earnings?

Haynie: For companies already established in the petrochemical business, yes. Newcomers will probably benefit less. Oil companies' earnings should benefit both from supplying raw material and from sales of chemicals.

Everitt: What is oil's biggest single problem today?

Hess: Excess capacity in all operations, particularly production. This will continue to be reflected in pressure on the price structure for both crude oil and refined products. In the United States, the proration laws of many producing states and mandatory federal import controls provide some protection for domestic crude-oil prices.

There has been some talk of an international proration agreement among major foreign oil-producing nations, but the likelihood of adoption appears remote.

Demand abroad is expanding at a respectable rate, and over a period of time this will tend to absorb some of the excess productive capacity. At the same time, we must recognize that over the next 5 years new sources of supply, such as Algeria and Libya in North Africa, promise to increase over-all productive capacity considerably.

In addition, exports from Russia and other Iron Curtain countries are likely to be stepped up and used increasingly as a political weapon to disrupt world oil markets. An intensely competitive atmosphere is likely to prevail for an indefinite period. Of course, all bets would be off if in event a serious international crisis that would disrupt the normal international flow of oil.

Everitt: What do you foresee for domestic refined product prices in the near future?

Haynie: If demand for gasoline continues to exceed last year, as it has done in the last few weeks, and refinery runs are not increased beyond the 7.9 million barrels per day reported for the week ending May 20, inventories can be brought into balance and provide a healthier climate for an advance in product prices before the middle of the summer.

Everitt: What is the prospect for crude-oil prices?

Haynie: As long as domestic product prices remain depressed, there will be pressure on crude-oil prices. I do not, however, look for any across-the-board cut, but there could be same more fringe cuts in individual areas. On the other hand, it is unlikely that crude-oil prices will be raised until demand catches up with supply or some form of prorating world-wide crude is adopted.

Everitt: Do you expect the industry to get and keep runs in line with demand in the near future?

Hess: I wish I knew. Whether the industry has finally learned that excessive runs in relation to current demand, failure to adjust runs and yields in accordance with seasonal fluctuations in demand and unsound marketing practices can only lead to chaotic price conditions, I just don't know. It is no wonder that the investing public has lost confidence in oil-industry managements and their ability to keep its house in order.

It is particularly discouraging since statistics on inventories, refinery runs, etc., are available on a weekly basis. Managements constantly have the pulse of the industry at their finger tips. Sooner or later, the temptation of the so-called "incremental barrel" and unsound marketing practices will have to give way to the realization that over-all petroleum demand is relatively inelastic and that attempts to enlarge one's share of the total market through price wars usually prove detrimental to the entire industry in the end.

I am hopeful that the industry will hold refinery runs to reasonable levels so that present inventory problems can be cleared up and profitable operations restored. But I'm keeping my fingers crossed.

Everitt: How do you expect independents going abroad to fare?

McElroy: They face many problems. The cost and less favorable terms of many of the new concessions indicate that, in some areas, even if exploration is successful the newcomers will be high-cost producers. Lacking refining and marketing outlets abroad and with restrictions on imports to markets in the United States, many independents, notably in Venezuela, have been unable to dispose of their new production. It would appear best to work out arrangements for joint marketing of new production with companies that have marketing outlets and to exchange production where this can be done to mutual advantage.

Everitt: What will happen to the profits of companies operating in Venezuela?

McElroy: The realization per barrel of production of the major companies has been about cut in half as a result of the retroactive tax increase levied at the end of 1958 and the price cuts made early in 1959. Recent wage increases have caused some further reduction in profits. While the worst of the erosion in profits has probably already occurred, prospects do not seem favorable for an early improvement. Import restrictions in the United States and continued displacement of Venezuelan crude in Europe by North African and Middle East oil should slow down materially future expansion in production.

Everitt: Would a correction of the troubles besetting product prices automatically strengthen crude prices?

Hess: If and when the domestic oil industry is able to get its house in order and the price structure for refined-product prices strengthens significantly, I would think that some of the recent price cuts would be restored. However, that's about as far as it might go.

In view of the surplus U. S. crude-producing capacity by the Government, and an import-control umbrella which can be raised or lowered, it seems highly unlikely that we shall witness much, if any, rise in domestic crude prices over the next 5 years. At best, any rise will do well to cover rising discovery and development costs. Abroad, excess productive capacity is of such magnitude that crude prices will do well to maintain stability, barring a serious international crisis.

Everitt: Will oil continue to be able to generate most of its financial needs internally?

Fourton: Probably yes, because, as the competitive struggle within the industry depresses the weaker companies, there will be a lessening need to allocate large capital expenditures for rapid expansion in the interest of maintaining a relatively strong position in future markets.

Everitt: If oil does have to go outside for capital, should it have any trouble attracting it?

Fourton: It would appear that underwriters, as is always necessary, would offer investors securities at a price established in accordance with the risks and prospects involved.

Everitt: How do price-earnings ratios for oils compare with other industrials?

Fourton: The oils are substantially depressed compared with the equities of other industrial companies. Stocks in the Dow Jones Industrial Average are selling at approximately 14.7 times estimated 1960 earnings of $42.60. The price-earnings ratios of the better companies in the various industries range between 8 times and 18 times. The international oil companies are selling at an average price-earnings multiple of 9.9 times, the domestics integrated companies at 11.1 times, and the producing companies at 15.3 times, (13.3 times excluding Superior Oil).

Everitt: Do you regard oils as a sound long-term investment?

Fourton: The answer, on balance, appears to be posi-

The Panel's Conclusions:

"It is no secret that oils have lost favor among investors. Their earnings have been disappointing in the last 2 years and investors have turned to stocks that seem to promise more in dividends or appreciation, or both. There are indications that oil's troubles are being corrected. That is one good sign. Another is the long-term outlook for energy needs. These needs should grow tremendously in this decade. Oil, as the presently preferred source of energy, should benefit accordingly.

"It is the consensus of this group that oil is gradually meeting its problems, that its position is improving and that, in the long run, oil stocks are a sound investment."

tive. However, from the standpoint of relative attractiveness, it appears inadvisable to ignore unfavorable factors likely to have a growing effect over the next year or two. Investors must be willing to assume further market price deterioration or, as a minimum, the absence of significant growth.

Therefore, unless the objective is a combination of current yield and possible long-term appreciation of moderate magnitude, the oils could only justify a relatively small percentage of portfolios. New funds are likely to be more profitably invested in companies in other industries, less hampered by severe competition and political problems and having more clear-cut prospects for growth.

Everitt: Is the tanker surplus a factor in currently weak markets?

McElroy: Yes. Depressed tanker rates permit distant crude to compete successfully in many more markets than usual. The resulting intense competition adds to the pressure on oil prices generally.

Everitt: Oil has been losing out to natural gas. Has this hurt and how long will it last?

Haynie: There is no question that natural gas has made large inroads in home heating. I do not, however, expect this trend to continue for long. Natural-gas prices at the wellhead are rising, and transportation cost to markets makes gas heating expensive, particularly in the Northeast. Intrastate gas business will probably expand more rapidly as industry moves to gas-producing states.

Everitt: How effective have import controls been? Do you expect to see them tightened?

McElroy: Import controls have been effective in protecting domestic crude producers from an unlimited flood of low-cost foreign oil. This, however, has not brought about a prosperous domestic oil industry because of overproduction of refined products and imperfections in the present system of import controls. These factors have brought about declining prices for refined products and gradual erosion of the crude-price structure.

What is needed primarily are greater efforts by management to keep refinery throughput more closely geared to market requirements. Such action, together with tightening import controls by requiring each company to use its import quota in its own refineries, would be more effective in eliminating price weakness than reducing import quotas.

Everitt: How will the development of nuclear energy affect petroleum demand in the future?

Hess: The consensus is that total world energy demands will increase at such a rate over the next several decades that nuclear energy for peaceful purposes will provide a welcome supplement to that provided from other sources.

Everitt: How does the prospect of smaller annual gains in demand affect oil's earnings prospects?

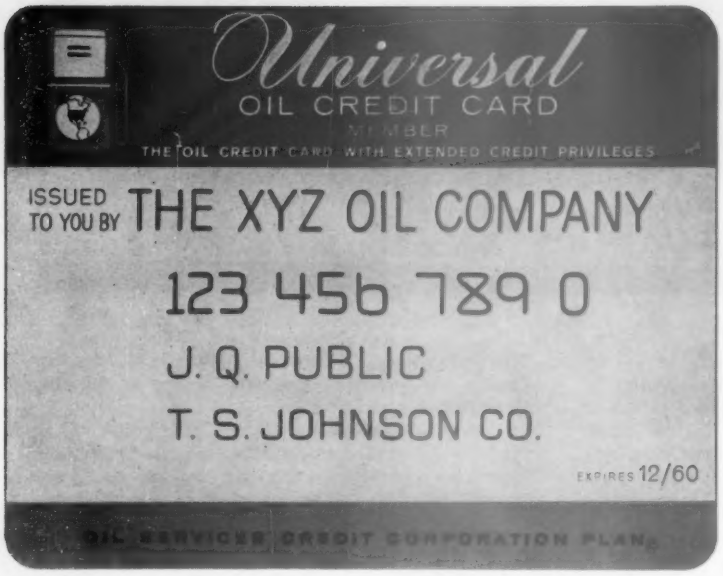
Fourton: Earnings, in general, appear unlikely to show the same significant increases as recorded in the past. Only at such time, at least a year or two hence, when demand may reach a more favorable relationship to refining and marketing facilities, and when the stronger companies may find it unnecessary to maintain the tight price pressures currently curtailing the historic growth of minor companies, can investors hold out some hope of any important earnings improvement. Such longer-term prospects are, of course, weakened by the possible further decline in the annual growth rate of demand, which may develop from competitive new sources of energy.

Everitt: What effect do you expect North African oil to have on world markets?

McElroy: Discoveries in the French Sahara and Libya obviously have complicated the current problem of oversupply. Completion of pipelines in Algeria should permit production of about 135,000 bbl. daily in 1960, possibly 345,000 bbl. daily next year, with output in the neighborhood of 500,000 bbl. daily by 1965.

Output from Libya probably will not reach the market before 1962, and less is known about is production potential. Output of 200,000 bbl. daily is a possibility for 1962 with a potential level by 1965 close to that expected in the French Sahara. Thus, potential new sources of supply from North Africa may approximate 1 million barrels daily within 5 years.

Because of its favorable location with respect to the large European market, North African oil, to the extent that it is available, will displace an equal amount of crude from Venezuela and the Middle East. As previously mentioned, the anticipated growth in demand should absorb this new production if it moves into the supply stream in an orderly manner. With these new sources of supply seeking a market, however, any lifting of the pressure on world crude prices does not seem likely for some time to come.



Universal Card Ready

• Independent firm will take over credit-handling chores for an undisclosed number of oil firms, with first cards to go out August 1. Initial coverage: 40 states.

THERE WILL be 500,000 universal oil credit cards in circulation by September 15, good at stations of participating oil companies in 40 states.

This number will increase to between 2 and 3 million by January, 1961.

Within 3 to 5 years, Oil Services Credit Corp. of Chicago expects 25,000,000 universal oil cards to be active.

The first of the universal cards will be issued in August.

Ralph W. Applegate, Chicago industrialist and president of Oil Services, made these predictions last week in unveiling the new universal credit-card plan at a press luncheon in Chicago.

Applegate said "a number" of companies already are committed. Credit-card holders of these companies will be sent a new universal card, bearing the name of the issuing oil company as well as the OSCC insignia (OGJ, May 9, '60, p. 108).

Among industry leaders openly endorsing the universal card plan is Stanley O. Breitweiser, Tulsa, president of D-X Sunray Oil Co.

"It's about time we stopped complaining about high credit-card operation costs," he said.

"It's time for constructive action, and sound solution, before these costs get any higher. The universal credit card plan is the only concrete solution worked out, to date, for this problem. We will be shirking our responsibilities if we miss this opportunity."

Full-dress presentations of the OSCC plan have been made to more than 40 companies in the last 10 months.

Applegate said fees would be:

... Three to 6% of sales if OSCC handles all processing and billing.

... One half of one per cent, if companies continue to do their own processing.

If a customer's average sales ticket is $7 or more for a month, credit handling charge will be about 3% if OSCC does the work. If the average ticket is $3.50 or less, the 6% fee will be charged. OSCC said it will compute a customer's average each month.

Low cost, high volume . . . Applegate said the average cost to an oil company for setting up a credit-card account is $4.50. OSCC, he said, can do it for $2.10.

Another major saving, he said, will be in the purging of inactive card holders. OSCC plans to screen cards after 12 months and propose cancellation of those abused or not used.

Credit tends to increase business, he said. Surveys show average service-station credit sale is $5, compared to a $2 cash average. Studies of large mercantile chains, he added, show that in the last 20 years credit sales have increased 10 times, compared with a fourfold increase in cash sales.

OSCC is inaugurating an extended-credit plan in which the customer will be charged extra 1½% monthly on accounts over 70 days old.

The card . . . The new card will be black, white, and gray. By eliminating the customer's address, it will be less acceptable to stations of companies not participating.

And, if it is used at stations not members, it is subject to withdrawal.

Myron S. Weeks, executive vice president, said companies agreeing on the plan expect to replace their company cards as soon as practical.

The universal card will be good for purchase of fuels and lubricants, accessories, services, and repairs up to $25.

Applegate said OSCC believes the plan will increase sales through merchandising of credit buying, exchanges of sales with companies in other areas, addition of new credit-card customers, and an aggressive national advertising campaign.

He also predicted it will cut costs by centralizing credit investigation, processing, and collection follow-up.

OSCC will establish processing offices in centrally located cities. It hopes to reduce the time lag between purchase of products and billing.

Phillips Offers Credit to College Grads

Some 180,000 graduating college seniors have been offered Phillips Petroleum Co. credit cards—for the asking.

"Your college diploma is your credit reference," say letters sent to all seniors in 4-year accredited schools in Phillips' 36-state marketing area. Letters are signed by sales managers of 18 divisions. The letters ask graduates to send their names and permanent home addresses. The cards are issued for 6 months and are automatically renewable.

The Phillips letter congratulates the graduates, advises they can purchase gasolines, products, and services with the card and adds: "The card can be used as a reference to establish further credit."

Early returns—some schools are just now completing their commencement week exercises—indicate that 30 to 40% are requesting cards.

HALF a MAN *is not enough!*

human interests must balance technical efficiency

Consistent improvement has been made over the years in the quality and service of Western Heat Exchangers, as well as in providing more effective solutions to the heat transfer problems of our customers by recognizing the need for keener insight into the personalities and problems of the **people** with whom we deal — our suppliers, customers, employees and associates.

Every advance we have made in design, mechanics, metallurgy and fabrication is the product of engineers — not engineering — **creative individuals** whose technical proficiency is balanced by their understanding of the individual problems of the people we serve and with whom we work.

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. . . is in the hands of men — *whole* men — whose professional acumen is matched by an insight to the human relationships in engineering. This vital need is more completely exposed in the latest of Western's "engineer-advancement" messages, the first few lines of which are shown at right. A complete pamphlet on the subject is available to you, singly or in quantity, upon request.

One of a series appearing in OIL & GAS JOURNAL, CHEMICAL ENGINEERING, PETROLEUM REFINER, REFINING ENGINEER, CHEMICAL ENGINEERING PROGRESS.

Facts-of-Life for successful engineers must include attitude, self-appraisal, vision, understanding, respect, relaxation and "happiness"

Achieving "success" and/or "happiness" in your professional and personal future won't just "happen," regardless of how diligently you apply yourself to your daily tasks, unless your efforts are coordinated along specific paths of endeavor. Your life as an engineer must be counterbalanced by your life as an individual — because "engineers ARE human," despite comment to the contrary.

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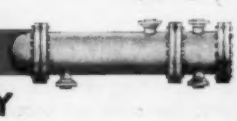


WESTERN SUPPLY COMPANY

P.O. Box 1888 – Tulsa, Oklahoma

Oil May Rob Coal of Naphthalene Market

- Sun and Tidewater announce plans for big petroleum-derived naphthalene plans as Ashland lets contract for first plant. It will end coal's monopoly.

THE NAPHTHALENE industry, traditional source of mothballs, is in for some airing. A mass invasion of this historic stronghold of the coal-tar industry is now under way by the oil industry.

By the end of next year producing capacity for this important chemical intermediate will be increased by 50% as three oil companies begin pouring out the flaky solid at the rate of 225 million lb. per year.

This newest petrochemical wave broke over coke-oven operators and coal-tar distillers in three rapid announcements last week. Ashland Oil & Refining Co., which late last year revealed plans for the first plant, let a contract last week for its new unit at Catlettsburg, Ky.

A day later Sun Oil Co. announced plans to build a 100-million-pound plant at Toledo, Ohio. On the following day, Tidewater Oil Co. and Collier Carbon & Chemical Co., an affiliate of Union Oil Co., revealed they will build a 50-million-pound plant at Tidewater's Delaware City, Del., refinery.

Ashland will be first in the field. Its 75-million-pound plant will be completed by Badger Manufacturing Co. by the end of next February. The other two plants will follow on stream late next year.

Since the early days of World War II, petroleum has taken the lion's share of benzene, toluene, and xylene output away from coal tar. If history repeats, the new processing approach to naphthalene promising mass production of high-purity product will also bring this coal tar chemical into the oil camp.

Product and price . . . Naphthalene has come a long way since mothballs. Today it enjoys a rising demand for such end uses as resins, plastics, dyestuffs, rubber, and paints. Between 80% and 95% of domestic production now goes into the synthesis of phthalic anhydride.

But production and prices have been erratic, and the field was ripe for a petrochemical invasion. During the past 6 years the 13 companies which extract naphthalene from coal tar have varied production from 295 to 491 million pounds per year. Last year's 408-million-pound output was about average for the period.

Imports have also been erratic, roughly compensating for domestic producers' varying output. In 1959, imports totaled 59 million pounds compared with 122 million pounds in 1955. Steel strikes have contributed other uncertainties in supply, since naphthalene production is based solely on coke-oven operations.

Prices have shown resultant fluctuations. In recent months, naphthalene users have lived with fairly short supply and high prices. Crude product brings about 5 cents per pound, while posted prices for high-purity flake naphthalene have ranged between 10 and 15 cents.

None of the three companies entering the field has mentioned price. But the mass-produced, highly refined naphthalene they plan to pour on the market will undoubtedly be competitive, even with the lower-cost imported chemical. Sun, with the largest plant, announced that its entire output was already placed with domestic buyers on long-term contracts.

The processes . . . All of the new plants will employ a basic hydrodealkylation process, converting the double-ring alkyl naphthalenes found in petroleum distillates to very high purity product.

The processing procedures will differ however, since each plant will employ a privately developed synthesis.

Ashland's Hydeal process, now licensed by Universal Oil Products Co. will also produce 15 million gallons of benzene per year. Last year Ashland announced perfection of the process, and plans for a plant at the North Tonawanda, N. Y. refinery operated by the affiliated Frontier Oil Refining Co. Later the plant was scaled up 50% and the location was switched to Catlettsburg.

Sun gave no details on its own process. It will produce high-purity naphthalene from intermediate petroleum stocks.

The joint Tidewater-Collier unit, which Tidewater will operate, will be designed to use a process developed by Union.

Imports to drop . . . The prospect of a jump in naphthalene capacity from about 425 to 650 million pounds per year portends an oversupply of this major chemical intermediate.

One likely prospect is a sharp reduction in imports, to which buyers have resorted in times of short supply.

The major entry of petrochemical naphthalene further signals a decline in coal-derived production. The pattern is familiar. Benzene, toluene and the xylenes, once the sole province of the coal-tar industry, have long ago swung to petroleum chemicals which now dominate the field.

Naphthalene however, is a new type of petrochemical—the first of the double-benezene-ring family to be made commercially from oil. The abrupt entry of the oil industry in this area may lead to further inroads in higher molecular weight aromatics and naphthenes.

New Service Firm Formed

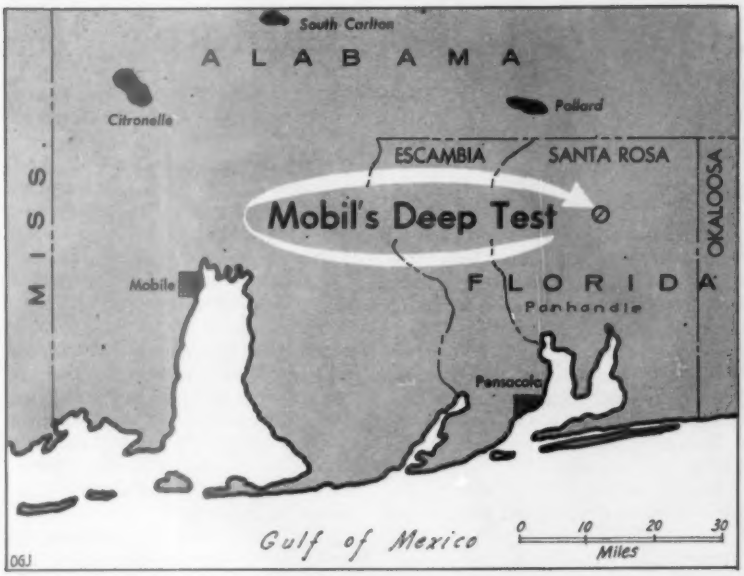
Dowell Schlumberger Corp. has been formed jointly by Dowell Division, Dow Chemical Co., and Schlumberger Ltd. Headquartered in London, the new company will serve the Free World outside U. S. and Canada.

It will combine all parent firms' services including Dowell's cementing, acidizing and formation fracturing, Johnston's drill-stem testing and Schlumberger's well logging and perforating. Dowell president Dr. A. P. Beutel is board chairman, Guy E. Baboin of Schlumberger is president, L. P. Swan is vice president and Tromer R. Smith operations manager.

INDUSTRY

Negotiations for the purchase of Intex Oil Co. by Clark Oil & Refining Corp. have been suspended. The companies said: "Circumstances which prompted the conclusion that association at this time is not as advantageous as originally hoped may change . . ." It was originally expected that Clark would offer one share of common and one of preferred stock for each five shares of Intex common (OGJ, April 18, p. 98).

A new name has been proposed for Halliburton Oil Well Cementing Co. Stockholders will consider adoption of the name—Halliburton Co.—at the annual meeting June 28, in Duncan, Okla. Halliburton officials feel the abbreviated title will more accurately



Mobil Spuds Deep Florida Test

• The Hosston formation is the target of this 13,000-ft. wildcat in the state's "dry" panhandle region.

DEEP, untested horizons in northern Florida's oil-prospective, but so far unproductive, "Panhandle" region will be explored in a significant wildcat started by Mobil Oil Co.

The deep test, in Santa Rosa County, has as its ultimate objective the Hosston formation at the base of the Lower Cretaceous section. This formation is expected at a depth of 13,000 ft. The test was below 6,000 ft. last week.

Scores of wildcats have been drilled across this part of Florida but only a few have gone below the top of the Lower Cretaceous, at depths generally above 7,000 ft.

Hosston is a developing productive horizon in South Mississippi, but the nearest field is roughly 100 miles from Mobil's test. Except for three tests, there has been no drilling that deep in intervening southern Alabama. Those tests were in the areas of South Carlton and Citronelle fields, more than 50 miles distant. They were not productive in that horizon.

Big spread . . . The Mobil test, in the C SW NW 35-4n-3w, is 10 miles south of the Alabama border on a 100,000-acre expanse of timberland area spread across Santa Rosa County, into adjoining Okaloosa and Escambia counties of Florida, and westward into Baldwin County, Alabama.

Of the 100,000 acres, 90,000 are owned by St. Regis Paper Co., on which the test is located. Prior to selection of the leases, Mobil spent nearly 2 years in extensive geophysical and geological studies covering an optioned block of 235,000 acres in southern Alabama and western Florida.

Nearest oil or gas production is at Pollard, 15 miles northwest across the state line. This field, discovered in 1952, produces from the much shallower Eutaw - Tuscaloosa sands of Upper Cretaceous age at depths of 5,200 to 5,900 ft. Of the four other oil fields in southern Alabama, only Citronelle produces from deeper than Tuscaloosa sands. These are the Rodessa and Sligo zones above the Hosston.

Florida has only one commercial oil field. This is Sunniland, in Collier County, which produces from the Sunniland lime formation of the Glen Rose section of Lower Cretaceous age.

Small amounts of oil have been produced from the same formation in two wells, now abandoned, at Forty Mile Bend, 45 miles southeast of Sunniland, in adjoining Dade County.

Mobil's Florida operation is under its Houston Exploration and Producing Division, headed by H. L. Waszkowski, Jr., vice president.

BRIEFS . . .

reflect the nature of the company, which performs major services other than cementing. Also the company markets some of its products and services outside the oil industry.

The New Mexico Conservation Commission has increased the July oil-production allowable in the San Juan area to 70 bbl. daily per basic 40-acre unit, an increase of 9 bbl. daily. Allowable for the larger southeastern New Mexico producing area was left unchanged at 33 bbl. daily per unit.

A special election to permit drilling on tidelands and submerged lands at Santa Monica, Calif., is being asked in petitions filed by the Santa Monica citizens committee for harbor development. A favorable vote would allow Mobil Oil Co. to explore tidelands controlled by the city under a contract awarded in 1954 subject to changing the drilling restriction. Mobil offered 35% royalties and $500,000 bonus.

Rocky Mountain Gas Co., Salt Lake City, has been bought by Petrolane Gas Service Co., Long Beach, Calif., for $400,000. Rocky Mountain was a pioneer propane-butane distributor in Utah and Idaho. Petrolane operates in 11 western states.

Construction of Humble Oil & Refining Co.'s 44-story building in downtown Houston has been contracted to W. S. Bellows Construction Corp., Houston. Work will start immediately and be completed in mid-1962. Foundation work is being completed.

Northern Saskatchewan areas will be surveyed and mapped by eight field parties working under the direction of the province's department of mineral resources. The parties, comprising five-man teams of geologists, will work in the Precambrian shield for about 4 months.

A 13-member board which will set the standards for antismog devices for automobiles registered in California has been named by Gov. Edmund G. Brown. The oil industry is not represented on the board, but the automotive industry has one member, John G. Spencer, San Francisco, general manager of the California State Automobile Association.

Is Stored Gas Subject to Law of Capture?

- **Lone Star says it isn't, as it files suit against a firm producing gas from a reservoir into which Lone Star has injected 21 billion feet for storage.**

LONE STAR GAS CO. has gone to court in a new effort to plug an exasperating man-made leak in a big underground-gas-storage project.

For about a year now, Lone Star has been injecting and storing purchased gas in a Bacon lime reservoir of East Texas' Tri-Cities field, and an independent operator has been producing gas from a well at the extreme southwest end of the pool.

The gas company lost the first round last fall (OGJ, Oct. 19, p. 81) when the Texas Railroad Commission refused to approve proposed new field rules. The regulations would have sealed off the puncture—or at least choked the flow from it to an insignificant dribble.

Now Lone Star is suing Sanders & Murchison, of Athens and San Antonio, Tex., for more than $100,000 in Henderson County District Court.

Before court action ends, it may answer an important question—and one which apparently has never risen before:

Does an operator who injects gas he bought and paid taxes on retain title to the gas when it goes underground in to storage? Or does the gas then again become subject to the law of capture?

If the courts decide in favor of the latter, it could deal a heavy blow to the potential of gas-storage operations in depleted oil and gas pools in Texas.

The situation . . . The well causing all the fuss is the 1 W. W. Jackson in the northeastern corner of an 89-acre tract in Section 12, Jacob Tator Survey. It was completed as a dual gasser from the Bacon and Travis Peak pays in 1959 with a potential of about 900,000 cu. ft. daily from the Bacon.

The gas is being sold reportedly to a small industrial account in nearby Athens.

The Bacon reservoir, taking in about 2,400 acres, was classified a gas-storage zone in 1956 by the Texas commission at Lone Star's request.

Lone Star unitized the multiply-owned pool to pave the way for storage. The unit agreement gave the company the right to store gas indefinitely and produce liquids not recoverable by primary means.

The Sanders & Murchison acreage was included within the proposed unit boundary. But the firm never signed the unit agreement and there is no compulsory unitization in Texas. Thus the Sanders-Murchison acreage remained outside.

In hearings last fall, Lone Star pointed out that the commission had recognized that there was no recoverable gas in the Bacon when it approved the storage.

It said it has spent more than $5,000,000 to develop the project and injected more than 21 billion cubic feet of gas.

And, if the offending well is permitted to produce 1,000,000 cu. ft. daily over the life of the storage operation, it would eventually produce 85% of the project's entire 22.5 billion cubic foot capacity, the company claimed.

Lone Star, a company official testified, can not continue to operate the project if the well is permitted to keep on draining gas from the reservoir.

Punitive damages sought . . . Lone Star claims in the court action that the law of capture does not apply in a case where the gas has been severed from a reservoir and later replaced.

It asks the damages of $37,000 as the reasonable market value of the gas it claims to have lost, plus $75,000 in punitive damages, plus added damages for any additional gas withdrawn and sold up to the time the suit is decided.

In answer, Sanders & Murchison attorneys allege such a suit could be heard only in Travis County, where headquarters of the Railroad Commission is located.

In addition, they say state statutes vest authority to regulate drilling and production of oil and gas wells in the commission. And the Athens operators have a valid permit to product their well.

Sanders & Murchison also says Lone Star has not been able to show proof of wrongful acts on which to base its request for exemplary or punitive damages.

Minimum Bonus Asked in Lease Sale

THE BOARD for Lease of University of Texas Lands will put up for lease July 12 more than 42,000 acres in 11 West Texas counties.

And, for the first time, the board has set a minimum acceptable bonus for all leases offered.

The minimum will be $2,000 for a quarter section and $4,000 for a half section. Drilling blocks will require more, depending on size and location.

Focus of interest in the July sale will be Winkler County, where the board is offering three drilling blocks of 1,922.1 acres each.

The first, Tract 110, is a little less than a mile north of the University Block 21 Delaware pool. Terms include a minimum bonus of $30,000 and a 5,100-ft. Delaware sand wildcat to spud in within 180 days from the sale date.

The other Winkler blocks are Tract 117, just 1½ miles east of the Block 20 Delaware pool, and Tract 120, 2 miles to the northwest of the Warwink Delaware gas-distillate area. Each requires a minimum bonus of $25,000 and a 5,300-ft. Delaware wildcat.

Also offered is a 2,628.6-acre block in Upton County about 1½ miles southwest of the Block 4 multipay pool. This one will take a minimum $25,000 bonus and an 11,500-ft. Ellenburger wildcat.

A block in Reagan County requires a minimum bonus of $10,000 and a 3,200-ft. San Andres wildcat. It comprises 968.7 acres about 4½ miles east of Big Lake pool.

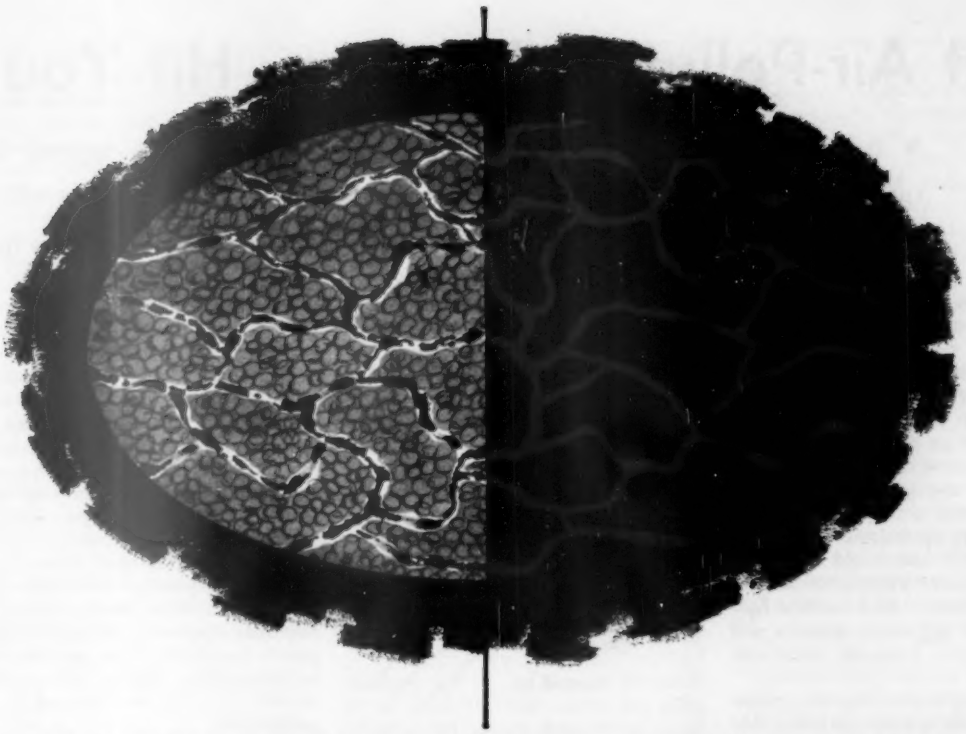
Other leases are offered in: Andrews, Crane, Crockett, Pecos, Ward, Loving, Culberson, and Coke counties.

Northeast Arizona Test Set

HUMBLE OIL & Refining Co. is preparing to spud a well 6,500 ft. northwest of Arizona's first commercial—but currently shut-in—oil well.

The new 5,600-ft. Mississippian test will be located just 1,650 ft. from the Arizona-Utah state line, in the East Boundary Butte area of northern Apache County, Arizona. It is 18 miles west of Four Corners.

The area has several shut-in wells, most of them gas wells. The original producer, however, was a 47-bbl. oil well with a gas-oil ratio of 87,344 to 1. Drilled in 1955, it was shut-in because the excessive gas could not be marketed.



A SURFACTANT SUMMARY

Halliburton surfactants are surface active chemical agents . . . carefully blended and compounded to help improve and restore old wells and condition new wells for a faster pay-out. Here's the Surfactant Story . . .

■ **HOWCO HYFLO . . .**

A surfactant to help increase the effective permeability of a producing formation by removing water-oil emulsion blocks and water blocks. The removal of these restrictions with Howco Hyflo is your most economical approach to improving oil production.

■ **MCA (Mud Cleanout Agent) . . .**

A process pioneered by Halliburton ten years ago and is still used with great success as a first stage treatment in the removal of drilling mud solids. The surfactant in MCA is also effective in removing most oil-water emulsion and water blocks. MCA is a hydrochloric acid solution containing 3% (by volume) surface active agent to obtain these results.

■ **HOWCO OILSPERSE . . .**

A specially designed mud removal solution – used primarily on oil-in-water emulsion muds and soap-oil emulsion muds. The excellent thinning and dispersing properties of this oil base solution is a new approach to mud removal.

ASK YOUR HALLIBURTON REPRESENTATIVE ABOUT THESE EXCELLENT AIDS TO PRODUCTION IMPROVEMENT!

275 SERVICE CENTERS . . . JUST MINUTES AWAY FROM YOUR WELL

HALLIBURTON
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HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

Next Air-Pollution Law May Hit You

• It will take an alert, smart oil industry to avoid getting tagged with restrictive and unnecessary laws in the future. Growing concern in official circles could spell trouble, but a proposed 10-year research project may help.

D. H. Stormont
Refining Editor

THE increasing concern of federal, state, and local health agencies over air pollution in most metropolitan areas foretells an oil-industry problem for years to come.

Refineries definitely will be involved. So will some transportation and marketing operations.

The industry also could be forced into unnecessary changes of motor-fuel composition or find demand hurt for fuel oil if aggressive research and public relations programs are not maintained.

A too-complacent industry might find itself saddled with restrictive, and unnecessary, laws. The oil industry, too, must keep abreast of the air-pollution problems facing urban areas because they have a habit of changing course quickly.

Air pollution, for example, a few years back consisted primarily of smoke. Abatement largely was obtained through better combustion, improved fuels, or by removing solids from the stack gases.

Today pollution primarily relates to the emission of a variety of gases, fumes, and solids, followed possibly by chemical reactions among them in the atmosphere. Industry is a contributor, but pollutants also come from the home, automobile, and many other sources.

Adverse effects . . . Air pollution is credited with causing several billions of dollars of damage annually by corrosion and soiling.

Agricultural damage in the Los Angeles area alone has been estimated to exceed $5,000,000 yearly. The same type "smog" damage has occurred to crops in many states, including Oregon, Washington, Florida, and New Jersey.

Yet to be determined is the effect of air pollution on humans. Recent research indicates it may be harmful to chronic bronchitis and heart cases. Lab studies on animals suggest relation between air pollution and lung cancer.

These possible adverse health aspects are causing the concern among public health officials. Most believe chances are small for another tragic episode such as those at Donora, Pa., or London, England. But as the air-pollution potential becomes greater in metropolitan areas, they believe much more should be known about what is going on in the atmosphere above these cities.

Finding this out will be the purpose of a 10-year research program now proposed by the U. S. Public Health Service. A 10-man task force, composed largely of health officials and educators, has been appointed by the Surgeon General to get the program under way.

Research stepped up . . . The program calls for some $250,000,000 to be spent in research during the next 10 years (see chart).

From the estimated current level of $11,700,000 annually, the research effort would be expanded to $30,000,000 during the seventh year of the program.

Industry's share of this accelerated program would be about 27%. The federal Government would supply 40%, and state and local governments would make up the other 33%.

Of the $8,500,000 to come from industry during the peak year, the petroleum industry's share would be approximately $850,000. This compares with about $150,000 being spent annually on American Petroleum Institute sponsored air pollution research programs. Total research effort of the petroleum industry in air pollution is now estimated at about $1,000,000 annually.

Nine goals have been proposed for the project. In addition to health effects, the program would include research in measurement and identification, agricultural effects, atmospheric reactions, and control methods. Industry's role would be primarily to develop adequate and economical control equipment and to study individual industry emissions.

A less elaborate study has been given immediate green light. President Eisenhower this month signed a bill directing the health service to study air pollution resulting from auto exhaust and make recommendations to Congress within 2 years.

Legislative trends . . . Pending this greater knowledge of air pollution and atmospheric conditions, the oil industry must deal with some local and state officials who believe refining and other oil-industry operations are the major causes of air pollution.

Because of the role played by hydrocarbon vapors in Los Angeles' smog problem, there is a tendency for other communities to adopt the highly restrictive rules applied there.

After having adopted rules pertaining to hydrocarbon emissions from tanks, separators, stacks, and other potential sources in refineries—all of which had little effect on the smog problem—Los Angeles' air pollution control officials then turned to the automobile.

A California state law now requires that all autos be equipped with devices to reduce the hydrocarbon and carbon-monoxide content of the exhaust gases. These must be installed within 1 to 3 years after two or more acceptable devices are available. Smog thus probably will cease to be a Los Angeles problem within the next few years.

Some of the rules in effect there, however, are of doubtful value. They would be even less needed outside the Los Angeles basin. This is particularly true of rules 62 and 63. Rule 62 bans the burning of residual fuels during 6

PIPELINE

Construction will begin in July on a 48-mile 20-in. line to bring gas from Jack and Wise counties, North Texas, to Dallas through the Lone Star Gas Co. system. Initial capacity of the line, which will handle residue gas from Lone Star's Springtown gasoline plant, will be 100,000,000 cu. ft. daily. Completion is scheduled for September.

Merger of Augusta Pipe Line Co., which operates a 50-mile 8-in. products line between Eldorado and Arkansas City, Kans., into Kaneb Pipe Line Co. has been completed. Herbert E. Fisher, Houston, is president of both companies. Augusta connects with Kaneb's 570-mile products system between Kansas refining points and

months of the year, and Rule 63 limits the olefin content of motor fuels.

Fuel-oil burning is prohibited during the months when smog is at its worst because additional sulfur dioxide is released to the atmosphere. But research has shown that the SO_2 content of Los Angeles air is much lower than that of other cities studied. Not only was there no need for anxiety on this score, but the studies indicated the high ozone content needed to produce bad smog attacks could not exist in the presence of a high SO_2 content.

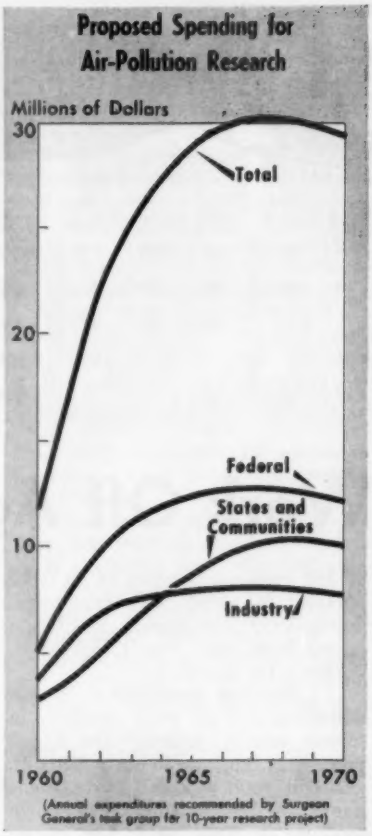
Rule 62 will probably remain on the books as long as smog is a problem in Los Angeles, however. And during the months it is in effect, fuel-oil use in the area will be reduced by some 23,000 bbl. daily.

This ruling could easily spread to other cities, resulting in further market losses of fuel oil to natural gas. At Hartford, Conn., air-pollution-control officials have considered adopting a similar ban. New York City officials also have discussed placing a top limit on the sulfur content of fuel oil.

Motor fuels . . . The role of olefins in motor fuels is a debatable issue, even though Rule 63 becomes effective this month.

Olefin content of gasolines can't exceed that indicated by a bromine number of 30. The limit will be further reduced to 20 bromine number on December 31, 1961. This means the rule requires an ultimate 50% reduction from the average content of a year ago.

Recent studies of the Bureau of Mines, however, show the olefin content of auto exhaust gases bears little relation to that of the fuel burned.



During the periods an auto is decelerating, there is some relationship. But during cruising and acceleration, olefin content of the exhaust was substantially independent of fuel composition. Isoparaffins, on the other hand, caused a higher percentage of olefins in the exhaust gases than did a like content of olefins.

The situation was summed up this way by G. A. Lloyd of Esso Standard at the Air Pollution Control Association meeting in Cincinnati.

"On the basis of present knowledge, no responsible scientist could claim that one type of gasoline produces significantly more smog than another. This means, in turn, that legislation designed to regulate the olefin of gasoline will have little or no effect in reducing smog.

"A car with dirty spark plugs, a too-rich fuel mixture, and faulty piston rings belches immeasurably more pollution than a well-maintained car, no matter what brands of fuel they both use."

While it is apparent that much more needs to be learned about the role of olefins and other hydrocarbons as air pollutants, there is danger that other communities might adopt control measures without proper study.

An outstanding example of what can happen recently occurred at Louisville, Ky.

Hydrocarbon vapors had little or nothing to do with the air pollution there. But a rule requiring vapor conservation roofs on tankage was adopted.

Nashville, Tenn., is now completing what is probably the most comprehensive study of urban air pollution and its health effects ever undertaken. The result: A rule controlling the escape of hydrocarbon vapors may be proposed.

All of this increasing interest in cleaner air for metropolitan areas indicates the possibilities for further controls. It means if needed, unrealistic controls are to be avoided, the oil industry must keep on the alert.

BRIEFS . . .

South Dakota. With Augusta's $3 million in assets, the combined companies have a worth of $18 million. Common stock was exchanged share for share.

A 23-mile 20-in. offshore line is being installed by Transcontinental Gas Pipe Line Corp., which has contracted the work to Brown & Root, Houston. Transco also has approval for 73 miles of 8 and 16-in. off the Louisiana coast and a 14-mile 20-in. line in New Jersey and Pennsylvania. Still pending before FPC are 7 miles of 16-in., 69 miles of 30-in., and 269 miles of 36-in. between Texas and New Jersey.

Some 158 miles of 36-in. loop lines between Kinder, La., and Centerville, Tenn., planned by Tennessee Gas Pipeline Co., have been approved by FPC. Also approved is a 11.6-mile 12-in. line from the Louisiana coast to Block 17, East Cameron area, offshore.

Two crude-line projects are under way by Federated Pipe Lines, Ltd., in Alberta, both contracted to Majestic Contractors, Ltd., Toronto, Ont. A 41.6-mile line is being laid from Oliver to Highbridge; 14 miles of 6-in. and 18 miles of 6 and 8-in. line is being laid in the Swan Hills area.

A 56-mile 2-in. line is planned by Kansas - Nebraska Natural Gas Co., Inc., to serve Quinter, Collyer, Zurich, Grinnell, Grainfield, and Park, Kans. It will be completed by August 1, 1960.

Also for Pipeliners . . .

IN THE NEWS: Interesting issue before Texas court involves question whether gas stored underground is subject to capture. Case arose over firm that drilled into storage reservoir (p. 86) . . . United Gas Corp. is making its research pay off in diversified activities (p. 92).

PLUS THIS TECHNICAL REPORT: Tanker uses waste CO_2 to prevent fire (p. 120).

CREW-MONTHS OF GEOPHYSICAL EXPLORATION 1958 vs. 1959

	U. S. A.			Canada			W. Hemisphere			E. Hemisphere			World		
	1958	1959	% change	1958	1959	% change	1958	1959	% change	1958	1959	% change	1958	1959	% change
Seismic	5,064	5,097	+ 0.65	1,065	796	−25.3	7,249	6,988	− 3.6	3,077	2,735	−12.5	10,326	9,723	− 5.8
Gravity	612	548	−10.5	65	41	−36.9	1,194	972	−18.6	670	517	−22.8	1,864	1,489	−20.1
Magnetic	55	51	− 7.3		1	+	102	52	−49.0	124	109	−12.1	226	161	−28.8
Other					3	+	2	3	+50.0	183	105	−42.6	185	108	−41.6
Total	5,731	5,696	− 0.61	1,130	841	−25.6	8,547	8,015	− 5.1	4,054	3,466	−14.5	12,601	11,481	− 8.9

Geophysical Work Off Again in '59

GEOPHYSICAL activity in the free world last year was off 8.6% from 1958 with work reductions recorded in all the major areas except the Far East.

Pace setters in the decline were Canada in the Western Hemisphere with a 25.6% drop in total geophysical work and Europe in the Eastern Hemisphere with a 14.5% drop.

Western Hemisphere activity as a whole was off 5.1%, and an even greater reduction of 14.5% occurred in the Eastern Hemisphere.

The report on geophysical activity was made after a study by a special committee of the Society of Exploration Geophysicists headed by Homer G. Patrick, Humble Oil & Refining Co., Houston.

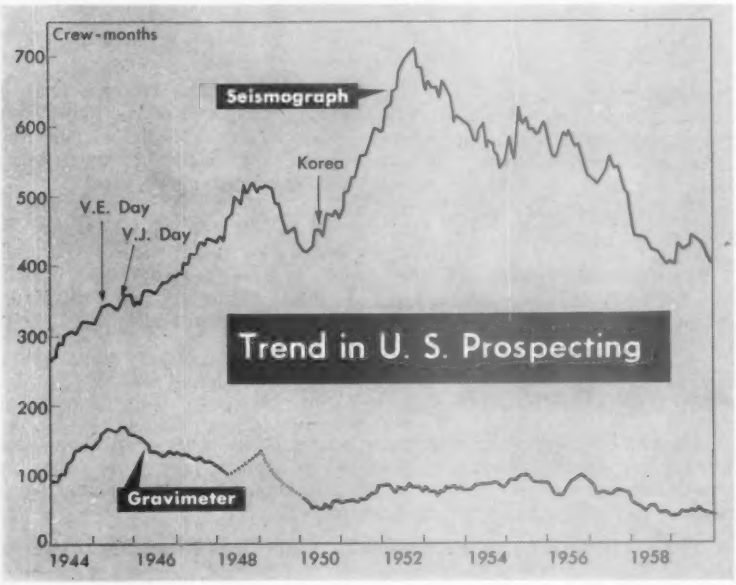
The committee reported an average of 957 geophysical crews of all types operated in world-wide exploration during 1959. The average in 1956, a record high year, was 1,136 crews.

Here's the picture in:

... **Western Hemisphere.** Biggest numerical loss of work occurred in seismic activity, although the largest percentage drop was in other methods.

Bright spot was the fairly stable number of U. S. seismic crews, which recorded a slight gain. Use of all geophysical methods in the U. S., however, was down 0.6%. The nearly steady work in the U. S. and Mexico was offset by declines in Canada.

... **Eastern Hemisphere.** Sizable drops in all phases of exploration work were reported. Unlike past years, no gains were shown for any single method.



There was some shifting of interest, however, with geophysical activity reported in the Netherlands, Spain, Switzerland, and United Kingdom. Other than seismic, gravity, and ground magnetics methods, work conducted included telluric current, electrical surveys, electromagnetic, airborne magnetics, and geoelectrical.

A look at methods . . . True to form, the Western Hemisphere led world seismic work, representing 71.9% of world total.

Of this, North America tallied 63.3% of the total effort, with the U. S. alone accounting for 52.4% of world activity. In South America, largest seismic activity was in Argentina with 3.1% of the total.

Seismograph work in the Eastern Hemisphere registered 28.1% of the world's crews. Europe had 10.6% of the total, barely nosing out Africa with 10.5%. Germany led European nations with 4.7% of over-all work.

Prospecting with gravity was decidedly off its previous pace throughout the world. The Western Hemisphere again was the prime objective of this method with 65.3% off all work. North America had 43.7% and South America 21.6%. The U. S. was most active with 36.8%. Brazil led South America with 8.7%.

The Eastern Hemisphere did 34.7% of world's share of gravity work, with Far East having 13.3%, Africa 7.8%, and Middle East 7.7%. All told, Eastern Hemisphere nations fell 22.8% below last year's mark in gravity exploration.

The U. S. story . . . Seismic work in the United States increased by 33 crew-months to a total of 5,097 during the year.

This represents a 0.6% increase.

Texas and Louisiana accounted for more than half of the total domestic effort which had a midyear peak of 440 parties working and a November low of 397 crews. Shooting actually dropped in Louisiana and advanced in Texas.

Experience of the other methods in the United States:

... **Gravity work** was markedly down with an average during the year of 46 units. The range of parties varied from 41 in January to 53 in late summer.

... **Ground magnetometer** work fell from 55 crew-months in 1958 to 51 in 1959.

... **Airborne magnetics** declined to nearly one-half of the previous year's work. From 121,396 line-miles flown in 1958, the total of 1959 was only 64,630 line-miles.

The leading areas in seismic prospecting in the United States include Texas, 33.9%; Rocky Mountain states, 27.3%; and Louisiana, 18.4%. Increases were noted both onshore and in coastal Texas, in Montana, Wyoming, Oklahoma, Kansas, and Mississippi. The Rocky Mountain region was off from last year. Coastal Louisiana also showed a drop.

Distribution of gravity exploration work in the United States showed the Rocky Mountain states leading all others and accounting for 31.4%. Texas was next with 27.2%, and the southeastern states ranked third with 14.0%. The coastal areas of Texas and Louisiana declined as did the Pacific Coast states.

Contract geophysical companies did 55.1% of the seismic work, 55.6% of the gravity work, and 31.4% of ground magnetics in the United States. Contractors' percentages increased in seismic and magnetic work but declined in gravity effort.

Canadian decline . . . Total geophysical activity in Canada has continued to fall since the peak year of 1952.

Seismic work declined from 1,065 crew-months in 1958 to 796 crew-months last year—a 25% decrease. Total seismic work in Canada last year thus was approximately one-half of 1954 activity. Gravity exploration work declined one-third from 65 crew-months in 1958 to 41 crew-months in 1959.

Alberta led in seismic activity last year with 549 crew-months. Totals in other provinces were British Columbia, 121 crew-months; Saskatchewan, 88; and Northwest Territories, 30. In gravity work, Ontario was first with 15 crew-months followed by Northwest Territories, 7; Nova Scotia, 6; Alberta, 5; and New Brunswick, 4.

Eastern Hemisphere . . . West Germany was the leader in geophysical activity among the European nations in 1959—a year in which a decline in the use of geophysical methods of all types was reported in Europe.

Germany's total geophysical work was double that of Italy, the second largest country. France was third.

Contractors did 73% of the seismic and gravity work—and almost all the other types carried out in Europe.

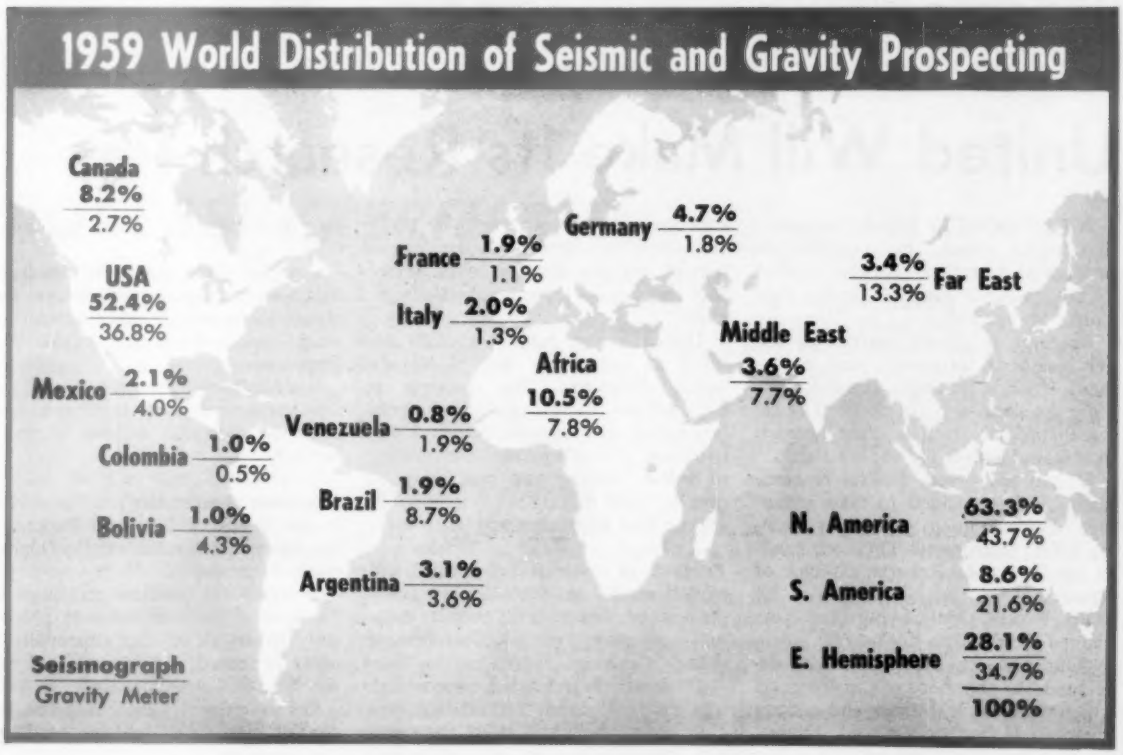
Geophysical exploration continued at a high level in Africa. Seismic work increased from 829 crew-months in 1958 to 1,019 in 1959. All other exploration methods showed a decline.

In the Middle East, seismic and magnetic work dropped while gravity-meter exploration rose slightly. Greatest activity was in Iran and Turkey. Oman and Iraq following in that order.

In the Far East, a slight decline in seismic work was more than offset by increased use of gravity and magnetic methods. The over-all activity exceeded that of 1958.

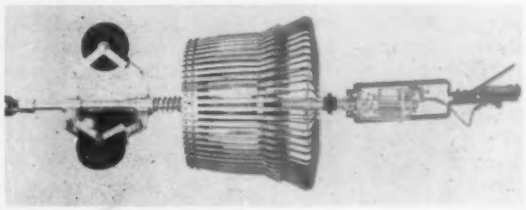
Other members of the SEG committee include Dr. Kenneth L. Cook, head of the department of geophysics, University of Utah; R. J. Copeland, British American Oil Co., Calgary; Santos Figueroa Huerta, chief geophysicist, Petroleos Mexicanos, Mexico City; Herbert Hoover, Jr., independent; C. N. Hurry, geophysical operations supervisor for the Carter Division, Humble Oil & Refining Co., Tulsa; Dr. Kumiji Iida, chief of the geophysical department, Nagoya University, Japan; Bart W. Sorge, president of United Geophysical Corp., Pasadena, Calif.; and R. L. Tucker, geophysicist for Socony Mobil Oil Co., New York.

1959 World Distribution of Seismic and Gravity Prospecting



TAPE RECORDER puts meter reading on tape, eliminates manual transcription. It has uses in other industries.

CHART AVERAGER handles almost any circular chart, averages temperature, gravity, or pressure.



PIPE CALIPER runs inside the pipe from 4 to 36 in. in diameter and measures the extent of corrosion.

Success with products like these is the reason . . .

CHART READER scans charts, makes calculations, and records the results—with only one operator.

United Will Make Its Research Pay

A CURRENTLY popular notion—that profit should be a deliberate product of operation—is being applied to the research arm of United Gas Corp., Shreveport.

Research is usually justified by the new methods, processes, and equipment which it produces to solve operating problems and cut costs. The research product itself is often licensed to a manufacturer for exploitation.

United has a very fruitful research team. It has decided to take advantage of development success by forming UGC Instruments Division, headed by D. T. MacRoberts, director of research.

Ed Parkes, United president, explained the decision this way:

"Our research department has developed a number of instruments which will be real time and money savers in United's operations. Interest expressed in the instruments by other companies has resulted in the formation of our new division to manufacture and market them on a nationwide basis."

United is thus adding another activity to a business that is already widely diversified. The company is engaged in oil and gas production, processing, gas transmission and distribution, petrochemicals, the mining of sulfur, mining and processing of potash, and mining and milling of copper and molybdenum.

Products of research . . . United will exploit several products, the most important of which will permit automatic handling of gas-measurement data.

Data will be recorded on continuous magnetic tapes for feeding into computers which will print and compute volumes and print customers' bills.

Another UGC product—the internal pipeline caliper—will measure and record the extent of internal corrosion of the pipe wall. It will work in pipe sizes from 4 to 36 in.

Automatic relighters for oil and gas-field heaters and an improved dew-point detector also will be produced and sold.

Electronic chart reader . . . The device, in the words of President Parkes, is the most spectacular of the United research products.

It solves the problem presented by the need of gas companies to process daily thousands of charts manually in order to record and compute gas volumes.

Orifice meters which measure gas do not give direct volume readings.

They record on a chart the basic data from which volume can be calculated. Other data needed for deriving volume must be obtained from instruments which record temperatures and specific gravity of gas.

Visual readings and several separate manual operations requiring several people are necessary to determine volume. And here's where the electronic chart reader comes in. It will scan charts, make calculations, and record the result on a dial and tape. Only one operator is required.

Linear chart averager . . . Another important instrument is the linear chart averager, which continuously averages temperature, gravity, or pressure charts.

It will handle almost any circular chart. Again, only one operator is necessary.

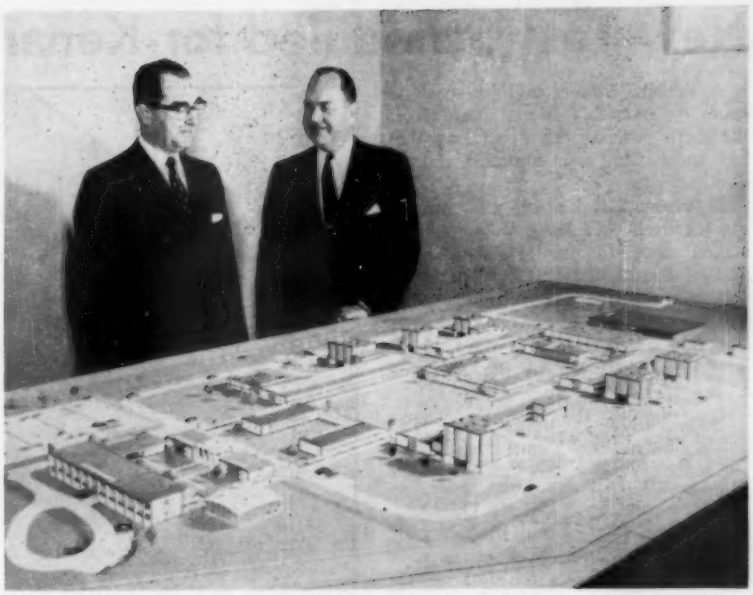
Tape recorder . . . This miniature recorder, developed for use with domestic meters of utility companies, will have its main application in retail merchandising.

It will be used in production accounting, inventory work, stock control, and point-of-sale recording.

In meter reading, it will eliminate the meter reader's route book and many separate postings required before bills can be prepared. Readings are recorded on tape and no manual transcription is necessary.

Marketing plans . . . Three of the products—the chart averager, heater relighter, and dewpoint detector—are already in production.

The chart scanner is a custom item and, like the caliper, will be built on order. The meter recorder will be in production later this year.



MODEL is checked by Texaco Chairman Augustus C. Long, right, and President James W. Foley.

Texaco Starts Process-Research Center

TEXACO Inc., is preparing the site this week for a $7.5 million research center for its refinery and petrochemical operations at Port Arthur, Tex.

The campus-style center will draw together more than 100 scientists and engineers now scattered about the refinery and give them fully equipped research facilities.

The center will concentrate on pilot, or semicommercial, projects in contrast to fundamental research done at Texaco's Beacon, N. Y., center.

The projects will cover the general range of processing, such as development and manufacture of new petrochemicals, the search for better and cheaper refining processes, the composition and uses of asphalt, problems in corrosion and contamination, and studies in fuels and lubricants.

The center will be located on 35.2 acres of land. It will consist of 15 separate laboratory and office buildings, a 200-seat lecture hall, six pilot-laboratory bays, service buildings, and enclosed storage areas. Covered walkways will connect the buildings.

PROCESSING BRIEFS . . .

A synthetic-phenol plant, using benzene as a feedstock, will be built by Hooker Chemical Corp. on the Kentucky side of the Ohio River near Portsmouth. The new plant will be operated by Hooker's Durez Plastics Division with completion planned by the end of 1961.

Mobil Oil Co. has expanded its program to market gasoline containing tetramethyl lead into Sioux City, Iowa, after inaugurating the program at Syracuse, N. Y. Mobil is the second major to use the new antiknock additive. Standard of California was the first.

Atlantic Refining Co. will cut its work force 20% at its 156,000 bbl. Point Breeze refinery in Philadelphia. The payroll will be reduced from 3,750 to 3,000. No replacements have been made since January 1. Some employes will be given early retirement, and others will be laid off. Efforts will be made to find jobs for those separated. R. D. Bent, vice president and general manager of manufacturing, said the step is being taken to remain competitive.

A detergent additive developed specifically for diesel fuels is being marketed by Oronite Chemical Co. It is a mixture of ash-free, organic, surface-active compounds which provides protection from gums and rust on injection system parts.

Also for Refiners . . .

IN THE NEWS: New cuts increase pressure on crude prices (p. 73) . . . Expansion of market-demand proration is a hot topic before Interstate Oil Compact Commission (p. 74) . . . The Universal credit card makes its debut (p. 82) . . . More oil companies getting into naphthalene field (p. 84) . . . Industry must be alert to unnecessary air-pollution laws (p. 88) . . . Castro threatens to take over Cuban refineries (p. 95) . . . Italians win right to build first Tunisian refinery (p. 96) . . . Latin America looms as good market for refinery construction (p. 98).

PLUS THESE TECHNICAL REPORTS: Automation for gas blending (p. 108) . . . Training craftmen for electronic instrumentation (p. 112).

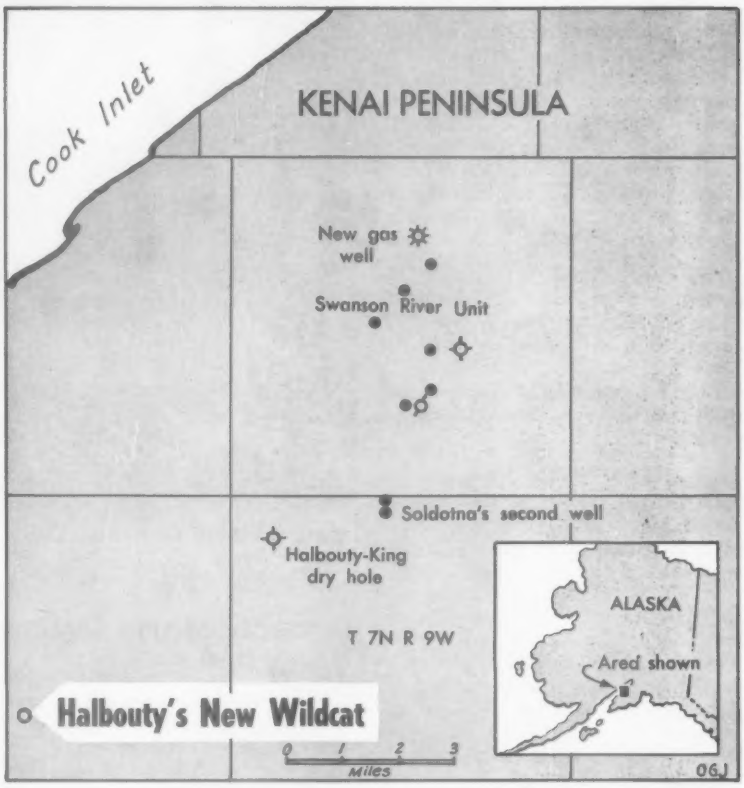
New Test Scheduled for Kenai Peninsula

A RANK wildcat will be spudded soon on Alaska's Kenai Peninsula, the only part of the new state that has turned up any commercial production.

Halbouty Alaska Oil Co., operator for itself and King Oil Co., have staked location for Halaska - King 1-B in Section 21-6n-9w. The wildcat is about 5½ miles southwest of a deep dry hole drilled by Halbouty last year and about 9½ miles southwest of production in the Soldotna Unit.

Location of the new Kenai test comes at a time when little good oil news is coming from Alaska. Early this month, two dry holes were announced, one by Richfield Oil Corp. in southern Alaska and the other by Paul G. Benedum & Associates in West Central Alaska (OGJ, June 13, p. 74.)

Richfield will move 2 miles north of its 1 Kalaikh to drill a second hole, but no additional wells have been announced by the Benedum group. Richfield's well is in the Katalla-Yakataga area.



Some good news . . . One bright spot in Alaska's exploration news was the report last week that a second well has been completed in the Soldotna Creek Unit operated by Standard Oil Co. of California.

The Soldotna 32-4 flowed an estimated 700 to 800 bbl. of 35.6°-gravity crude on choke. Producing interval and choke size were not released, but the well was completed as a producer. Total depth is 11,119 ft. The 32-4 is 290 ft. south and 180 ft. east of the unit's discovery well.

The Soldotna discovery well produces from the Eocene-Hemlock sand at 10,228-10,585 ft., the same pay that is found in the Swanson River Unit just to the north. The wells in both units are believed to be in the same formation.

Standard of California is operator in both units. Richfield is the other major owner in the units. Union Oil Co. and Ohio Oil Co. have minor interests. Six oil wells and one gas well have been completed in Swanson River and the two oil wells in Soldotna.

New Catalyst Offers Flexibility

. . . in modern fluid cracking units. Commercial testing due this year for new Davison silica-magnesia compound.

HIGHER YIELDS of gasoline and furnace oil and lower yields of coke, light gases, and residual fuel oil in fluid catalytic cracking are made possible by a new catalyst.

It is a stabilized silica-magnesia catalyst, SM-30, containing about 28% of magnesium oxide. It was developed by the Davison Chemical Division of W. R. Grace & Co.

The catalyst has undergone extensive laboratory and pilot-plant testing and is expected to be tested on a commercial basis this year. In addition to effecting changes in yield, it maintains higher effective activity and meets the thermal stability and regenerability requirements of current fluid units.

Since no one or two types of catalyst can completely satisfy the varying requirements of the oil industry today, Davison expects to see the silica-magnesia catalyst in demand.

Seasonal differences between heating-oil and gasoline demand can be compensated to an appreciable extent by the silica magnesia catalyst. This possibility has long been recognized, but the production of a catalyst with satisfactory regeneration rate and good thermal stability has not been possible.

The new catalyst can be produced in particle sizes equal to Davison's present 13 and 35% alumina catalysts.

At 60% conversion, these are the differences between SM-30 and 13% alumina: Weight per cent, coke down 0.8; C2 and lighter, down 1.1; volume per cent, propylene, down 3.1; propane, down 1.3; total C4, down 4.8; C5-410° F. gasoline, up 7.0; light naphtha, up 0.5; heavy naphtha, up 7.2; furnace oil, up 5.0; and heavy gas oil, down 5.0.

Suspense Mounts for Refiners in Cuba

• Fiery Fidel could "intervene" and seize refineries of three majors who refused to process Russian crude. But he can't ignore crude-supply problem.

OIL COMPANIES in Cuba are waiting for the other shoe to drop.

Fidel Castro dropped the first one when he reacted in his typically violent fashion to the refusal of three major companies to process Russian crude in their Cuban refineries.

The revolutionary head of Cuba's left-wing and economically shaky regime warned Texaco, Esso, and Royal Dutch-Shell to "reconsider" their turndown of the Cuban offer of Russian crude. Castro said the companies will have to face the "consequences" unless they change their minds.

There was no indication last week that any of the three will change its mind.

Castro's emotional reaction to the oil companies' standpat move, which he called an "act of treachery," came 3 days after a surprisingly mild reply by Cuba's oil institute. Alfonzo Gutierrez, head of the institute, shrugged off the company refusal as a matter of "not too much importance" (OGJ, June 13, p. 82).

What's involved . . . At stake is at least $150 million. The bulk of this is the minimum capital investment of at least $75 million in the three modern refineries operated by the three companies. About $60 million worth of Cuban pesos have been piling up daily in Cuba's National Bank which the government has refused to convert to dollars. The foreign exchange represents Venezuelan dollar oil imported to run the Cuban refineries. Marketing facilities make up the rest.

Much more could be involved. If the three companies bow to Cuban demands that they process 10,000 bbl. daily of Russian oil, they could face similar demands in other countries being courted by the Soviets. It has already started in India. A further spread could mean economic disaster to all three.

If, compelled by local governments, to sidetrack their own crude supplies in favor of Russian oil, the local refining and marketing operations lose all attractiveness.

Castro's next move . . . All three of the major oil companies took a calculated risk in turning down the request of the dictatorial premier of Cuba. It is apparent the companies believe, for the moment, they hold higher cards than Castro.

It would be relatively simple for Castro to seize the refineries. He has taken over sugar mills, ranches, hotels, and other industrial properties owned by Americans.

The refineries could probably be operated for a lengthy period by Cuban personnel. With the exception of a few managerial people, they are already Cuban-operated.

A crude supply is the hitch. Castro may make emotional speeches to the Cuban people crying "imperialism" and "monopoly," but he'll try to be assured of a crude supply before he makes a move.

The Russian oil supply offered Cuba for the balance of this year is 6,480,000 bbl., or about 30,000 bbl. daily, in exchange for sugar. This is less than half Cuba's daily oil requirement.

The Russians could probably double this oil supply, if they want to cut exports to other areas for the political hay they could make in Cuba. But again, there's a hitch. It is doubtful if the Russians could muster enough tankers to move that much crude.

The only easily accessible source is Venezuela, Cuba's present source of supply. Castro could hardly count on Creole (Jersey Standard) or Cie. Shell de Venezuela, Venezuela's two largest producers, for a supply.

There is little likelihood that any of the independent newcomers to Venezuela would step forward and volunteer crude to Cuba.

Three possibilities . . . It is pretty generally conceded that Castro now has three courses to follow, actually only two. He can:

. . . Back down and admit the oil companies have the power to force him to retreat. The loss of face involved in this would be ruinous to a man in Castro's position.

. . . Intervention, the method recently in use in Cuba, involves just ousting management and taking over.

. . . Outright seizure through nationalization. Ernesto "Che" Guevara, economic czar under Castro, has already approached oil worker unions to ask if they can run the refineries.

Castro's other shoe is dangling by a single lace. It's only a matter of time until he drops it.

Qué hay de nuevo?
Get the latest from Creole—by phone

OIL COMPANIES overseas provide a lot of services, but Creole Petroleum Corp. has come up with a new one.

Residents of Amuay, Venezuela, are now learning up-to-the-minute news of the day—local and foreign—by picking up any company telephone and dialing "312." The service is so popular that other Creole areas are asking for it, and it may spread to other companies.

"Dialing for the news" got its start during collective bargaining earlier this year between companies and the oil workers union. The management of Amuay refinery provided latest word on negotiations via the telephone lines that had been reserved for giving the correct time.

More than 50,000 calls were made during the negotiations. By the time the new contract was signed, local and international news had been added, and the service was too popular to drop. La Salina District on Bolivar Coast is adopting the service, and other Creole areas are asking for it.

Britain Tempts New Marketers

• The growing market in the United Kingdom and dealer dissatisfaction with established suppliers are luring several companies, including CFP and ENI.

A NEW BATTLE of Britain may be shaping up across the Atlantic between established gasoline marketers and newcomers seeking a foothold for fast-growing foreign supplies.

United Kingdom is the biggest gasoline market in Europe, and outsiders show every intention of getting a piece of it. In a part of the world where fuel oil is the prime product, more profitable gasoline sales last year rose a healthy 7.5% in the U. K. to 168,000 bbl. daily.

Even better, the entire gain was accounted for by a 16% increase in sales of premium grades. Sales of regular actually fell.

Conditions appear ripe for outsiders to make a move into the local market. Service station owners in Britain have been voicing a growing dissatisfaction with agreements tying them to one brand. The country's service station association has urged its members either to go independent or to dicker for better deals with their suppliers when existing agreements expire.

Of 36,000 service stations in the country, more than 80% have long-term agreements with established companies. But many of these are of the 5-year variety and will expire this year or next.

The established gasoline marketing affiliates of international companies are Esso Petroleum, Shell-Mex & B.P. (Royal Dutch-Shell and British Petroleum), Regent Oil (Caltex), Mobil Oil, and Petrofina. An important local company, National Benzole, markets with Shell-Mex & B.P.

There is little immediate danger of the majors losing much volume. The big question is whether independents shopping abroad for gasoline bargains, or newcomers trying to develop their own marketing organizations, will precipitate a price war. These are already bedeviling the industry in parts of West Germany and Italy.

Marketers to watch . . . The company that may make the most serious bid is Total Oil Products, the marketing arm of CFP, a French company that is co-owner of Algeria's Hassi Messaoud oil field. Total this year has tied down a crude sales contract in Japan, and set up a marketing subsidiary in Australia. It is expected to be one of the first newcomers to start selling gasoline under its own brand name in Britain.

Total already leases bulk plants at Ellesmere Port and Holehaven. It sells diesel fuel and gas oil to commercial users. It also sells gasoline to private distributors, which market it under their own brand names.

Competition may also be in the offing from Italy's government-owned ENI. Its aggressive chairman, Enrico Mattei, has been holding talks with some of the biggest chains in U.K. He has also publicly stated a desire to establish his organization in the country.

Tidewater Oil drew attention as a possible new contender when it recently purchased land at Holyhead. The company will open a 20,000-bbl. refinery in Denmark next year, and there is speculation as to how soon, and what type of products the country plans to move into England.

Russian gasoline could come into the picture as an important competitive factor. But so far, lubricating oil is the only Soviet product distributed locally.

The easiest method of entry for a newcomer is to win contracts from fleet owners or other commercial users. But this market is shrinking because of a growing preference for diesel-engine vehicles. Gasoline consumption by commercial users last year slipped 3%. Gasoline deliveries to retail dealers, on the other hand, rose 10.8%.

One example . . . One of the most closely watched marketers in the country is Jet Petroleum, a small, private chain selling cut-rate gasoline through about 40 outlets. Most of the company's supplies, so far, have been coming from Venezuela.

Prices have been relatively stable. But some of the high-volume outlets which would be in a position to go independent already offer rebates in the form of free newspapers or gift products. Many smaller, privately owned outlets are more closely bound to their suppliers by long-term loans.

The Jet Petroleum board includes fleet owners who for years have operated their trucks on nonbranded imported gasoline. This may prompt other commercial users to follow suit.

New Russian Line

. . . will furnish crude for new Hungarian refinery.

CONSTRUCTION has started on the Hungarian section of a 2,500-mile pipeline system that will carry Russian crude to four satellites in eastern Europe.

An 80-mile spur is being laid southward from a branch of the system extending into Czechoslovakia. The route swings east of Budapest, then doubles back to Szazholmobatta, a town south of the capital where a 60,000-bbl. refinery is under construction.

The Hungarian section will be able

FOREIGN

Competition from low tanker rates drove deliveries from Trans Arabian Pipe Line Co.'s Sidon, Lebanon, terminal down to the lowest point in its 10-year history in May. Shipments of Saudi Arabian crude from the terminal averaged 198,882 bbl. daily. The 1,069-mile Tapline system can carry as much as 450,000 bbl. daily.

British Hydrocarbon Chemicals, Ltd., plans a butadiene, methanol, and ethylene dichloride plant at its Grangemouth, Scotland, works. The units will be completed next year. Fluor Engineering & Construction Co., Ltd., London, has the contract for the butadiene plant.

A heavy rig used to drill a gas discovery in the Irrawaddy Delta is being shifted to Central Burma for a deep test in Yenangyaung field. Burma Oil Co. (1954) Ltd. is standing by

to deliver up to 50,000 bbl. daily, with the balance of the crude for the new refinery to be supplied by local fields. Officials estimate the line will save $14-$28 million per year in transportation costs.

The government expects to complete the section by the end of 1961 and to start taking deliveries by mid-1962. Construction also is in progress on branches in Czechslovakia and Poland. The fourth satellite to be served by the line, which begins near Kuibysheu fields, is East Germany.

Sahara Frac Jobs Pay Off

THE FRENCH-SHELL company developing the Sahara's southeastern oil fields has begun hydraulic fracturing of marginal producers with notable success.

CREPS has released results of fracturing experiments on five Edjele wells and on one well in the more prolific Zarzaitine field to the north. The Edjele wells were either not producing or making from 75 to 150 bbl. daily before fracturing. After treatment, two nonproducers flowed more than 250 bbl. daily and the others produced from 190 to 377 bbl. daily.

The biggest increase came in a Zarzaitine well in an area where the producing pay normally has much better porosity and permeability than at Edjele. The Zarzaitine well, No. 48, which did not produce before fracturing made more than 1,570 bbl. daily after treatment.

ENI Wins Tunisian Refinery

• Authority to build the country's first refinery goes to Italy's state-owned company in a package deal.

A NEW REFINING agreement in Tunisia gives Italy's Enrico Mattei one of the biggest wins in his running battle with major oil companies.

The chairman of Italy's state-owned ENI has tied down rights to build Tunisia's first refinery, a project that several majors had hoped to undertake.

ENI's site for the refinery is near La Skhirra, Mediterranean terminal of a pipeline under construction from Edjele fields in Algeria.

The 20,000-bbl. plant will have a capacity double the country's present demand. Plans are to export the surplus.

The refinery will be operated by a joint company owned 50-50 by ENI and the government. Tunisia will pay half the cost of the $19 million plant.

Mattei hailed the agreement as one of the most important he has ever signed.

Package deal . . . Tunisias Secretary of State for Industry, Ezzedine Abassi, indicated the plant would not necessarily depend on the Edjele pipeline. He said oil would be purchased on the world market at lowest prices.

The refining rights are part of a package that includes an exploration concession award to ENI over parts of the Tunisian Sahara. This part of the agreement is similar to deals made by ENI in other countries.

The government will have half-interest in the operating company with no obligation to pay its share of the cost until commercial production is found. The government will also receive 75% of the profits. Much of the country however, is already under concession to Mobil International and SEREPT, Conorada, and Rimrock in partnership with SOM. The ENI rights are expected to cover an area of southern Tunisia to be relinquished by SEREPT.

ENI and Tunisia also are expected to set up a marketing company in the country. This would give the Italian group its own sales outlets for refinery products in addition to sales to established marketers.

Mattei's package offer edged out a proposal by a group of majors for a 10,000-bbl. refinery at La Goulette. Reports from Tunis earlier this year were that the government had decided in favor of this group, which included Jersey Standard, Royal Dutch-Shell, Petrofina and Mobil. The deal apparently fell by the wayside.

BRIEFS . . .

with a lighter rig in the Delta, waiting for government permission to drill evaluation wells at Payagon, where gas was encountered at 4,600 ft.

A wildcat has been started in the Rahmi area of Egypt by the government's General Petroleum Co. Location is 50 miles north of Ras Gharib field on the western side of the Gulf of Suez. A Russian-made turbodrill is being used to test the structure which is 13.7 by 1.6 miles.

A price of $2.17 per barrel was posted last week by Shell International Petroleum Co. for a new Iraq crude blend from two fields. The price is for Bai Hassan-Jambur blend delivered at the Banias, Tripoli, terminal of Iraq Petroleum Co.'s pipeline. The crude is 34-34.9°-gravity.

Eight German refining and marketing companies are working on plans for a 22-in. pipeline into Bavaria from Karlsruhe, the northern terminus of the big Marseilles-to-Germany line. The new 160-mile line would move at least 80,000 bbl. daily of crude into Bavaria. Companies involved are British Petroleum, Esso, Deutsche Erdoel, Shell, Gelsenberg-Benzin, Mobil, Schloven-Chemie, and Wintershall.

The largest tanker in Socony Mobil's fleet, Mobil Enterprise, was christened last week at Goteborg, Sweden. It has a dead weight of 48,600 tons and a cargo capacity of 410,000 bbl. It will be used as a crude carrier.

Netherlands State Coal Mines and Dow Chemical Co. will build a jointly owned phenol plant near Rotterdam. Part of the output will be marketed by Dow as phenol, while the rest will be sold to Algemene Kunstzije Unie as an intermediate, caprolactam, in the manufacture of nylon.

The world's largest crude-oil storage tank—with a capacity of 605,000 bbl.—is being constructed in Kuwait for American Independent Oil Co. The work is being done by Chicago Bridge, the British subsidiary of Chicago Bridge & Iron Co.

Three deviated wells, drilled from northern Peru under the Pacific Ocean, have been completed as producers by Belco Petroleum Corp., New York. The last well, Litoral 4-2, had an initial flow of 1,100 bbl. daily.

A new firm, Parsons Powergas, with headquarters in London, has been formed by Ralph M. Parsons Co., Los Angeles, and P-G Engineering, Ltd. It will perform complete engineering and construction of petroleum, petrochemical, and related plants.

How the Typical Latin Refinery Will Change

	1959		1970	
	Bbl. daily	% of crude	Bbl. daily	% of crude
Crude capacity	38,000		48,000	
Thermal cracking	10,000	26.3		
Catalytic cracking and/or hydrocracking	4,900	12.9	18,000	37.5
Thermal reforming	1,000	2.6		
Catalytic reforming			7,500	15.6
Hydrogen treating	1,300	3.4	8,000	17.0
Alkylation	300	0.8	1,800	3.8
Polymerization	240	0.6	640	1.3

Future Demand Pattern

Product	Average 1,000 bbl. daily 1959	1970	% Increase
Gasoline	458.0	1,605.0	250.0
Kerosine	141.0	580.0	312.0
Dist. fuel	261.0	1,080.0	314.0
Resid. fuels	531.0	970.0	82.8
Lubes	20.6	65.0	216.0
Totals	1,411.6	4,300.0	205.0

Big Refining Growth Seen for Latin America

LATIN AMERICAN refiners will spend more than $1.5 billion on expansion and modernization during the 1960's.

That's the implied prediction two Universal Oil Products men made at this week's meeting of the American Institute of Chemical Engineers in Mexico City.

S. W. Curry and E. W. Schnabel of UOP estimate that the average Latin American refinery will have to spend $20,000,000 in the next 10 years to meet demands on the refining industry south of the border.

Since there are 73 refineries in Latin America, this means that close to $1.5 billion will be spent by them alone. In addition, the UOP men believe the number of refineries in this area will grow to 90 by 1970. This would add at least a couple of hundred million more to the total.

Curry and Schnabel foresee substantial gains in demand for petroleum products in Latin America. They predict that today's demand of 1,411,600 bbl. daily will grow to 4,300,000 bbl. daily by 1970, a gain of more than 200%.

Here, in brief, is how the UOP men see the 1960's in Latin America:

... **Population.** To rise to 267,000,000 by 1970, an increase of 40% over the 1956 total of 190,000,000.

... **Motor vehicles.** To number 9,500,000 by 1970 as compared to 3,400,000 in 1956. This will be 1 vehicle to 28 persons against 1 to 55 in 1956.

... **Refinery yields.** Gasoline, kerosine and distillate fuel yields will increase at the expense of residual. Resid will drop from 38.7 to 22.5%.

... **Increased volume.** Production of refined products will be greater, with the biggest increases in gasoline and distillate fuel. Both will top residual, now the big volume product.

... **Octane rise.** Latin America's gasoline pool Research octane number which was 86.1 in 1959 will go to 92-93 RON by 1970.

Mexico Has Big Chemical Plans

- **Balanced production of needed chemicals from four big refineries and from special plants is target for 1961.**

A MAJOR building program this year and next is going to reduce Mexico's dependence on outsiders for petrochemicals.

Petroleos Mexicanos is well under way on a project to obtain a balanced output of chemicals from its four biggest refineries and from new plants in gas-producing areas.

The ambitious plans are disclosed by Florencio Lara Sosa, of the Instituto Mexicano de Ingenieros Quimicos, in a paper being presented this week in Mexico City at a joint meeting of the Instituto and the American Institute of Chemical Engineers.

Heart of the complex will be the 85,000 bbl. refinery at Minatitlan. Units here will produce a full range of aromatics and ammonia.

Other participating refineries are Atzcapotzalco, Ciudad Madero, and Salamanca. When the program is fully under way these plants will be producing ethylene, propylene, benzene, toluene, xylene, ammonia and acetylene.

Pemex now has a dodecilbenzene unit in operation at Atzcapotzalco and expects to have another producing synthetic rubber and monostyrene at Ciudad Madero in the not-too-distant future.

This is how the other projects line up at this time:

... **Ethylene.** The four refineries will have a combined output of 23,000 tons per year: Atzcapotzalco and Ciudad Madero, 7,500 tons each, Salamanca, 5,000 tons, and Minatitlan, 3,000 tons. Added quantities may be obtained from the catalytic dehydrogenation of natural gas and refinery gases.

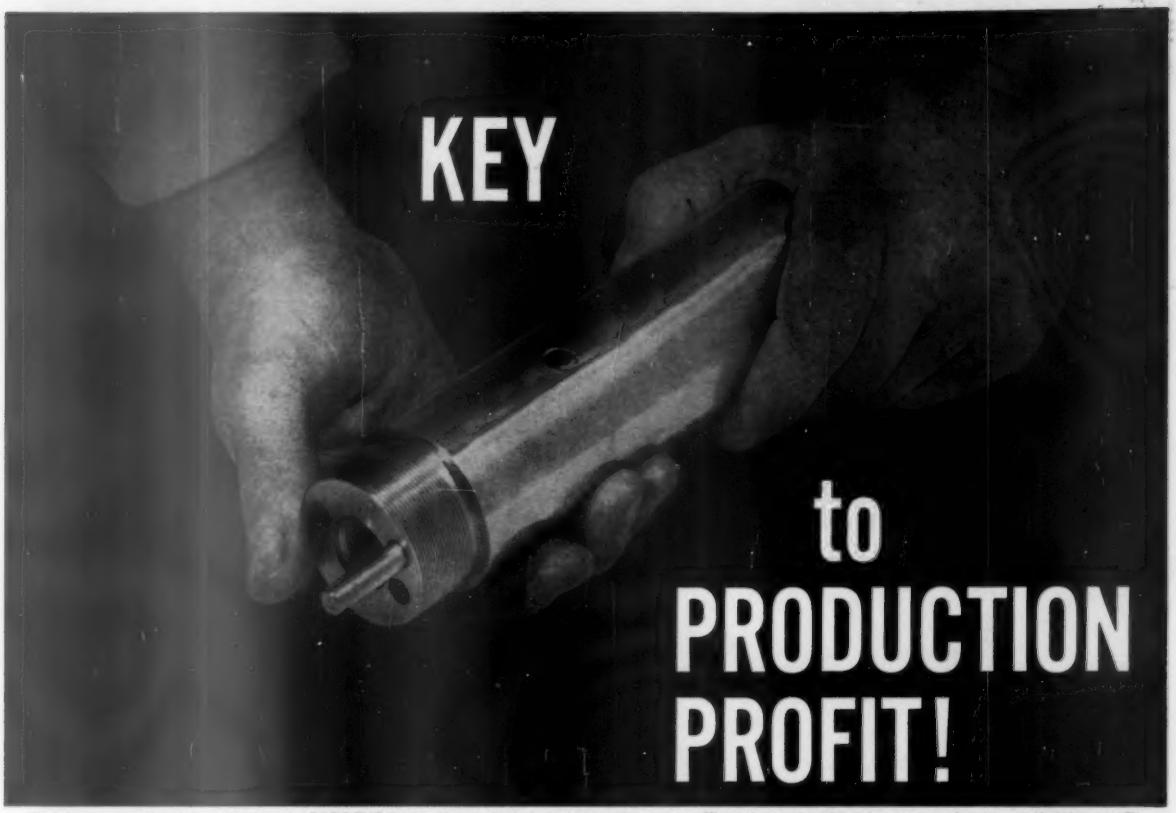
... **Propylene.** The four refineries are expected to produce 70,000 tons of propylene per year. It will go into the manufacture of tetramer for plastics and detergents and into cumene for phenol and acetone.

... **Aromatics.** Production of benzene, 367,300 bbl. per year, toluene, 711,635 bbl., and xylene, 532,580 bbl., will be confined to Minatitlan. This plant is scheduled to go on stream in 1961.

... **Ammonia.** Three plants are scheduled, each with a production of 200 tons per year. These will be at Salamanca, Minatitlan, and at a yet unnamed northern site. They will use natural gas as raw material. Because of the availability of natural gas, additional plants are contemplated at these locations in the future.

... **Acetylene.** Production is contemplated, but no plant site has been chosen. It will be located where natural gas is available and will follow completion of other plants.

Mexico is sorely deficient in benzene and has an immediate need for 70,000,000 lb. per year. It is importing large quanities and, when the Minatitlan facilities are fully in operation, a saving in exchange of nearly $80,000,000 annually is expected.



This flow-control valve — the key to SARGENT hydraulic pumping systems, the most efficient yet developed — is your key to production profit.

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When SARGENT took the long stroke unit from the TOP of the hole and placed it at the BOTTOM to operate the time-proved standard bottom-hole pump, things happened!

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4. Unrestricted application because the pump can be used on any well or on more than one well in group operations.
5. This pump has been operated on oil, salt water or fresh water as power fluid.

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BIRD'S-EYE VIEW of fracturing operations at the 1 John W. Baker, Knox-Bromide field, Oklahoma, when British-American and Halliburton teamed up to complete . . .

World's deepest successful frac jobs

- Operator didn't realize history was being made as fracturing treatment was applied to two gas wells in Knox-Bromide field. Result of this super-deep fracture job was a substantial increase in open-flow potential.

SUCCESSFUL FRACTURING of wells has now been accomplished below the 15,000-ft. level. This happened recently when the Halliburton Oil Well Cementing Co. was called on to treat two British-American Oil Producing Co. wells in Knox-Bromide field, Grady and Stephen counties, Oklahoma.

The wells involved in the treatment were the 1 John W. Baker (33-3n-5w) and the 1 H. C. Brickel, (4-2n-5w).

Both wells are producing from the second and third Bromide sands. Bottom of the perforations in the 1 Brickel is at 15,824 ft. while the lowest perforations in the Baker well are at 15,758 ft.

The 1 Baker

This well was completed in December 1957, with 7-in. casing set at 15,226 ft., with an open-hole producing section to 15,810 ft. Initial potential for the well was 17.5 M.M.c.f. per day.

Workover needed. Early in 1960, it was noted that the wellhead pressure and the flow rate of the well had declined severely. A workover of the well was clearly indicated.

In order to effectively stimulate the productive sand intervals, it was decided to set a liner opposite the pay, perforate, and fracture the well. This program was accomplished as follows:

BY JOHN C. THRASH
British-American Oil Producing Co.,
Oklahoma City.

Here are the vital statistics on these deepest fracture jobs . . .

	1 Baker	1 Brickel
Open-flow potential before fracturing, M.M.c.f.d.	7	0.040
Open-flow potential after fracturing, M.M.c.f.d.	12	3.65
Increase in open-flow potential, %	71	9,000
Fracture fluid injected, gal.	47,650	75,000
Sand injected, lb.	44,650	75,000
Nylon balls used	50	300
Maximum injection pressure, psi.	7,800	7,200
Average injection rate, bbl. per minute	21.3	21.3

The well was killed and the hole was displaced with oil-base mud. After cleaning out casing to total depth and establishing free circulation to bottom, a 5-in. N-80, 18 lb. flush joint liner was set from 15,104 to 15,809 ft. and cemented with 90 sacks. The cement was drilled out to a plug-back total depth of 15,781 ft.

A gamma-ray collar log was run for correlation with previous logs and selected intervals were perforated from 15,406 to 15,758 ft. with 4-18-g. jet charges per foot.

The producing formation was drill-stem tested and the natural capacity of the perforated intervals was calculated to be 7 M.M.c.f.d. by the state method of determining open-flow potential.

Rigged up for fracturing. Core and X-ray analysis showed the Bromide sands were composed primarily of quartz and dolomite. Some portions contained trace to small amounts of kaolinite and illite-type clays. Solubility in hydrochloric acid varied from less than 1% to a maximum of 75% and all permeabilities and porosities were relatively low.

In view of the water-sensitive clays and the solubility, Chemfrac (HCl in kerosine) was deemed most advisable to use as a fracturing fluid.

Tubing, with a rotary shoe, was run to bottom to check the condition of the hole, and was then picked up to a point just above the liner. The mud was displaced with condensate, and after displacement, the shut-in tubing pressure was 3,000 psi. and the shut-in casing was 3,400 psi.

Injection into the formation was initiated with a mixture of 20 gal. of surfactant concentrate in 40 bbl. of condensate followed by 115 bbl. of condensate. One T-10 truck was used for this part of the operation. The breakdown pressure reached was 7,500 psi., after which the pressure dropped to 6,900 psi., while pumping with an average injection rate of 1.34 bbl. per minute.

Because the well could not be treated satisfactorily at this low injection rate, equipment was rigged up for acid injection, and 2,500 gal. of 15% acid containing a special nonemulsifier was spotted on bottom and pumped into the formation. Initial breakdown pressure was 7,500 psi. after which the pressure dropped to 4,800 psi. The acid was displaced from the tubing with 60 bbl. of oil-base mud.

For the fracture treatment, Halliburton provided three pumping units—each capable of delivering 1,050 h.hp.—and three pumping units of 550 h.hp. each, and two sand proportioners. The number of pumping units used at any one time depended on the treating pressure encountered. The equipment requirements were designed for a minimum treating rate of 20 bbl. per minute at 7,000 psi. Provision was made for a standby blender and for pressure relief above 7,800 psi. in the event of a sandout by use of a spring-loaded back-pressure valve.

Fracture treatment. To check the injection rate, 120 bbl. of condensate was pumped down the annulus at 24-bbl. per minute rate and a pressure of 6,900 psi. Then 3,000 gal. of acid-kerosine fracturing fluid was pumped down the annulus. At this point, 20-

A TOTAL of 3,200 h.hp. was available for pumping fracturing fluids during operations on the 1 Baker well. The number of pumping units used at any one time depended on the treating pressure encountered.

BRITISH-AMERICAN ENGINEERS in a prefracturing planning session at the 1 Brickel are, from left, Mack May, drilling foreman for southern Oklahoma; George W. Murphy, district superintendent for central district; Gordon Tillmon, field engineer; and Jack Sherrod, field superintendent, both for southern Oklahoma.

40-mesh sand was added to the fluid stream at the rate of 1 lb. sand per gallon of fluid. After 3,000 lb. of sand had been injected into the formation, 50 nylon balls were dropped. Pressure started increasing gradually and reached the maximum permitted pressure of 7,800 psi. after 68,650 gal. of fluid and 65,650 lb. of sand had been pumped into annulus.

Trucks were shut down and the pressure was allowed to bleed off to 5,000 psi. in an effort to drop the nylon balls off the perforations. Pressure was increased to 7,800 psi. again but the well would not take additional treating fluids. Remaining fracturing fluid and sand were circulated out and the well bore displaced with oil-base mud.

HALLIBURTON ENGINEERS Gordon Bale, with radio helmet, and Weldon Baker help coordinate the job on the 1 Baker. In the center is the Fracometer, that records injection rate, hydraulic horsepower, wellhead pressure, sand-fluid density, and volume of fluid injected.

Average injection rate for the treatment was 21.3 bbl. per minute. Maximum pressure was 7,800 psi. and the minimum pressure was 5,900 psi. The highest pressure used was the maximum permissable for the casing in the hole.

A total of 1,960 bbl. of fluid and 44,650 lb. of sand had been injected into the formation during the stimulation treatment.

Well completed. Tubing was run in the hole and the fluid was circulated to remove gas-cut mud. Tubing was pulled and a 5-in. production packer was run on a wire line and set at 15,250 ft. After the tubing was run back, the well was allowed to flow to the pits to clean itself out.

Well was put back on production and was potentialed at 12.0 M.M.c.f.

The 1 Brickel

Treatment of the 1 Brickel preceded the treatment of the 1 Baker. The production history of the 1 Brickel is similar to that of the Baker well. It had been completed originally with the same general type of open-hole completion. After the well was cleaned out, a 5-in. liner was run inside the 7-in. casing and cemented from 15,038 to 15,866 ft. with 75 sacks of cement. After logging, selected intervals were perforated from 13,390 to 15,824 ft.

Fracture procedure. Formation was broken down with 105 bbl. of condensate with an injection rate of 21 bbl. per minute at a pressure of 6,800 psi. Then fracture fluid (75% HCl acid with 25% kerosine) with 1 lb. of 20-40-mesh sand per gallon was injected in six stages. Each stage consisted of 10,000 gal. of fluid and 10,000 lb. of sand followed by 50 nylon balls. The sixth stage was followed by 15,000 gal. of fluid and 15,000 lb. of sand, for a total of 75,000 gal. of fracturing fluid, 75,000 lb. of sand, and 300 balls.

Maximum pressure reached during the operation was 7,200 psi. and the average injection rate was 21.1 bbl. per minute using equipment as described for the treatment performed on the 1 Baker.

The treatment was completed successfully, production equipment was installed, and the well was placed back on production.

Potential improved. The original potential of the 1 Brickel taken in 1957 was 2.65 M.M.c.f.d. and the capacity of the well had declined to 0.040 M.M.c.f.d. at the time of the fracture treatment. The open flow potential after fracturing was increased to 3.65 M.M.c.f.d.

How blowouts are affected by:

1. Company policy

2. Drilling breaks

3. Mud weight to kill kicks

This is Part 1 of a three-part series that is one of the most important contributions of recent years to our knowledge of blowouts. This article shows what the oil company and contractor can do to create a climate of security against blowouts, and also shows how flow rates, so important to proper well control, can be calculated. The second article covers a method for killing blowouts which threaten during drilling, and the third tells how to control kicks while making a trip.

BY T. B. O'BRIEN
Gulf Oil Corp., Houston
and
W. C. GOINS, JR.
Gulf Research & Development Co., Harmarville, Pa.

NONE of the past articles on blowouts are really complete.

After a good start, each writer has said, "Put the well on choke and raise the mud weight." But no one said **how much** to raise the weight nor **what size** choke to use. Yet the correct answer to these questions is absolutely essential to bringing a well under control in the fastest, safest, and cheapest way.

This article shows, for the first time, a field-proven method to raise mud weight the proper amount. Usually, the correct amount to raise mud weight is less than most have thought. Second article in the series will show how to pick choke size.

In many areas, it is common to stop drilling and circulate out every "drilling break." The time spent in this could be reduced quite safely if not eliminated entirely.

Moreover, oil-company management can reduce the number of blowouts. Management's attitude is reflected right down to the rig floor. An intelligent and careful management attitude will show up in careful and intelligent handling of the wells. A casual attitude will result in casual well handling and more blowouts.

A frame of mind. Blowout prevention is not a matter of the number of valves in the preventer system, their arrangement, nor the ability of the people to operate them. These things—and others—are important, but they are not the prime essential.

Blowout prevention is a frame of mind among the drilling crew and supervisory staff. If the operator's management is determined to eliminate blowouts, this is far more valuable than adding equipment to control blowouts.

Blowout equipment is much like insurance. The greater the risk to life and property, the greater the cost of offsetting the risk. This article deals but little with equipment, except to say that if an item is used, it should be suitable for the job it is to do and should be in good working order. That is, blowout preventers should have a pressure rating equal or greater than any pressure expected in the well; but they need not be stronger than the casing on which they are installed.

Further, all equipment should be operated and tested often enough. Tests are particularly important after breaking any joints subject to pressure.

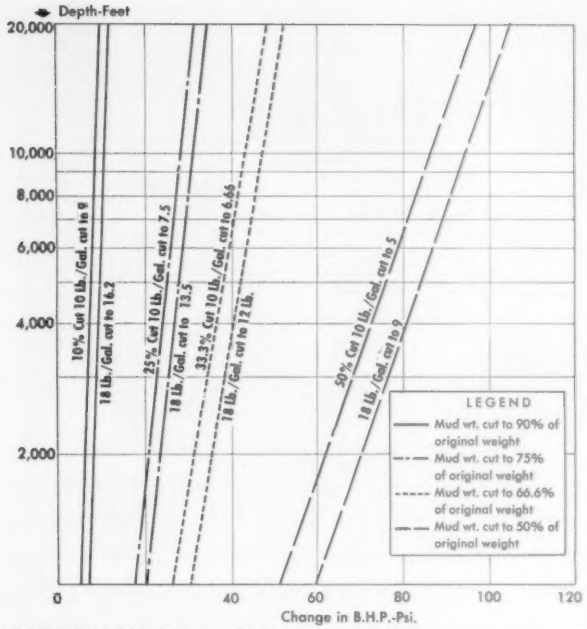
The particular items assembled as blowout preventers or the manner in which they are arranged are not so important. Each person has his own idea as to what should be used and how. Within reasonable limits this is not a bad situation, except that it costs the operator extra because the contractor has to maintain extra material. New arrangements are often developed in this fashion.

Farmer and Jones[2] state that more lives and money can be saved by practical training of crews than by any other means. As concerns rig operation, this is quite true, but training must go beyond the rig; it must go on into company policy. Companies in general give lip service to the practice of blowout prevention, but in many cases their policy has no "teeth."

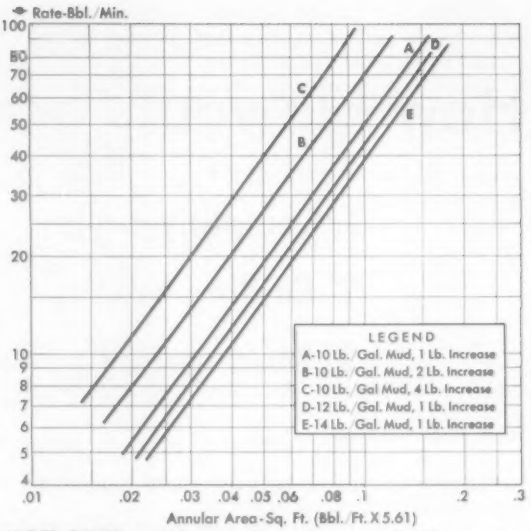
There are two periods when time is most critical in management's view. First is when a contract is being negotiated. Then, there is a tendency to belittle the possibility of blowouts in an effort to get a lower price. Second is when drilling slows down. Then, time lost in operation and testing of blowout preventers becomes more important than possibility of a blowout.

In either case we are looking at dollars, as we are when there is a suggestion that time be set aside for training personnel. Company policy about the problem is always reflected on the rig. It is necessary that management be certain the supervisory and operating personnel understand and know how to control threatened blowouts. Further, it should be well understood that no unnecessary chances are to be taken either with the condition of equipment or with operation of the well.

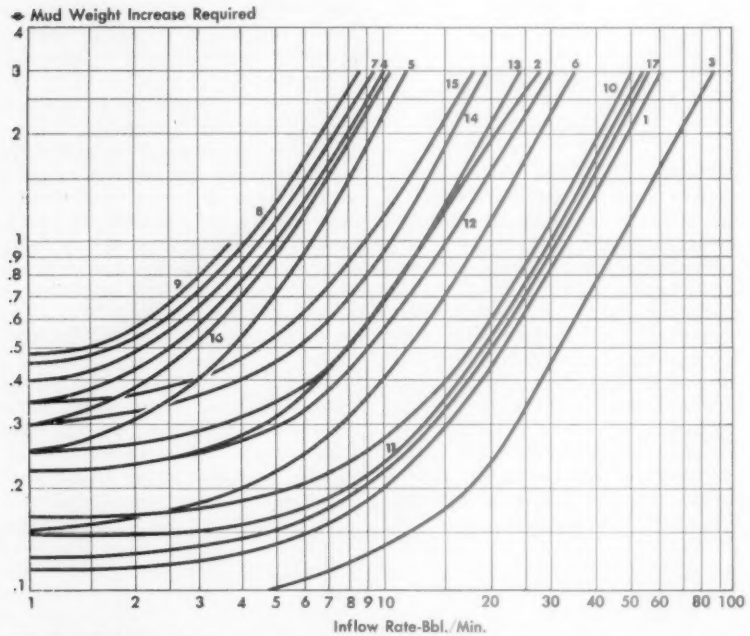
From a paper titled, "The Mechanics of Blowouts and How to Control Them," presented at 1960 spring meeting, API Division of Production's Southern District, San Antonio.



GAS DOWNHOLE is so highly compressed that gas-cut mud seldom reduces bottom-hole pressure seriously. Note that an 18-lb. mud at 15,000 ft. loses only 100 psi. in bottom-hole pressure when cut to 9 lb. per gal. Fig. 1.



MOST OFTEN, a kicking well can be controlled by as little as 0.5 lb. per gal. in mud weight. These numbered curves represent different combinations of hole and drill-pipe size (see Table 1) and the flow rates caused in these holes by inadequate mud weights. Fig. 2.



THERE ARE three things to note in this chart: the effect that annulus area has on flow rate (all curves); the effect of initial mud weight (curves A, D, and E); and the effect of differential pressures (curves A, B, and C). Fig. 3.

We do not mean this as a recommendation that preparations for drilling each well be elaborate to excess. But if the individual has a general knowledge of conditions to expect in a well, he can select a satisfactory rig having a crew that is competent to handle the problems that arise. In selecting a rig he should make it a point to see that rig in operation if possible. This gives him a chance to observe both the equipment and crew at work. A simulated kick might be arranged to see how it is handled by the crew.

Equipment. In some areas various accessory equipment is useful, if not essential, to safe operation. Among these are pit-level measuring devices, mud-weighing equipment, and meters measuring mud both into and out of the well. If gas cutting is a problem, a degasser is valuable.

These items assume more than convenience value when a well kicks. In fact, on occasion they can, if rigged up properly, give early enough warning of a kick that its intensity can be reduced. In most wildcat drilling, these items should be standard equipment. This is particularly true of pit-level indicators, as is shown in later installments.

Although pit-level devices are fairly satisfactory for mud measurement, a meter which accurately measures mud both in and out of the hole has recently been developed. For critical wells, it supplies the utmost in safety; very small changes in flow rate can be detected and the volume used to fill the hole while making trips can be measured.

Training. There are two phases of rig-personnel training. First, each crew should be made completely familiar with the care, maintenance, installation, and operation of every item of equipment connected with the blowout-preventer assembly. Several operators conduct schools for crewmen, with instruction on equipment being supplied by manufacturer representatives. Manufacurers will conduct the same type of instruction for the contractor at the rig.

Such instruction includes practical maintenance and handling instructions that can mean savings in upkeep and

TABLE 1—FLOW RATE FOR KICKS OF VARYING INTENSITIES

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
	Average all cases 140 ft. per minute						Inflow rate from formation, bbl. per min., at differential pressures (lb. per gal.) of:			Feet of hole filled per minute at differential pressures (lb. per gal.) of:		10 bbl. pit gain, inches per bbl. (lb. per gal.)		2.5 bbl. pit gain, inches per bbl. (lb. per gal.)	
Curve No.	Hole (in.)	Drill pipe (in.)	W_1	Mud weight = ΔP_A	Gal./min. at 140 ft./min.	Bbl./min. at 140 ft./min.	0.5	1	2	0.5	2	0.5	2	0.5	2
1	9⅞	4½	10	0.11	440	10.5	22	31	49	296	660	2.2	4.9	8.8	19.6
2	8½	4½	16	0.25	300	7.15	8.1	13	21	163	424	0.8	2.1	3.2	8.4
3	12¼	5	12	0.09	710	16.9	37.8	56.2	86.5	260	562	3.1	6.8	12.4	27.2
4	6	3½	14	0.32	140	3.34	2.52	4.95	7.8	112	347	0.2	0.78	0.8	3.2
5	6	3½	10	0.23	140	3.34	3.76	6.3	9.5	167	488	0.3	1.1	1.2	4.4
6	8½	4½	10	0.15	300	7.15	12.2	18.7	27.8	246	560	1.2	2.8	4.8	11.2
7	6	3½	16	0.37	140	3.34	2.16	4.5	7.2	96	320	0.2	0.7	0.8	2.8
8	6	3½	17	0.40	140	3.34	1.72	4.2	6.9	76	307	0.1	0.7	0.4	2.8
9	6	3½	18	0.42	140	3.34	1.55	3.7	...	69	...	0.1	...	0.4	...
10	9⅞	4½	14	0.16	440	10.5	17.6	27.6	41	236	551	1.7	4.1	6.8	16.4
11	9⅞	4½	12	0.14	440	10.5	19.6	30	44.5	264	600	1.9	4.4	7.6	17.6
12	8½	4½	14	0.215	300	7.15	9.2	15.2	23.4	185	473	0.92	2.3	3.7	9.2
13	7⅞	4½	10	0.21	240	5.7	8.02	13.3	20	202	505	0.80	2.0	3.2	8.0
14	7⅞	4½	14	0.30	240	5.7	5.7	10.6	15.5	144	392	0.57	1.5	2.3	6.0
15	7⅞	4½	16	0.34	240	5.7	4.75	9.6	14.3	120	362	0.47	1.4	1.9	5.6
16	6	3½	12	0.28	140	3.34	3.0	5.5	8.3	133	369	0.30	0.83	1.2	3.3
17	9⅞	4½	11	0.12	440	10.5	20.2	30.5	45.2	256	590	2.02	4.52	8.0	10.0

ΔP_A is increase in mud weight to stop inflow of 1 bbl. per minute if circulating at 140 ft. per minute. W_1 is mud weight, lb. per gal.

in the cost of replacing parts.

The second phase should consist of "on-the-rig" drills in handling potential blowouts. Drills consist of operating and testing blowout-preventer equipment so that each crew member becomes familiar with all equipment, its function and operation.

Then should come a "pit drill" where the pusher changes the pit-level indicator to simulate a gain or loss. The crew then goes through the necessary steps to prevent a blowout. Usually this means picking up the pipe and closing the well in if drilling is in progress. If a trip is being made and there is a gain in mud, the operation will be to start back to bottom.

The time required by each crew to perform these drills should be recorded. Quite probably, the first drills will take too much time; but with practice by the crew and determination on the part of the supervisor, the time will be cut. The time required from a readable change in volume to the time the well is closed in should not exceed 2½ minutes. If it does, the crew is slow or the equipment is unsatisfactory.

We will show later that time is of the essence in killing a threatened blowout. There is a definite need for practice so that many of the operations become instinctive. Then thought can be turned toward killing the well rather than operating the equipment.

Drilling Breaks

In unproved areas when abnormal pressures are expected, it has been standard to stop drilling and circulate out every drilling break. This practice has a very good basis, in that most wells are drilled with a minimum of 0.5 lb. per gal. excess mud weight.

An excess mud weight, and hence a high pressure differential between the mud column (Pm) and formation (Pf), reduces drilling rate considerably. But when the bit hits a formation with higher pressure, this overbalance is lost and drilling rate increases. However, formation pressure need not exceed mud pressure to allow drilling rate to increase; the pressures need be only nearly equal.

For a blowout to occur, formation fluids must flow into the bore hole. This, of course, means that formation pressure exceeds mud pressure. Result is a gain in mud volume in the pit.

The balance can be so close that the annular pressure drop while circulating is sufficient to balance the formation pressure. Then, there will be no flow until the pump is shut down.

What do you look for as a well is circulated following a drilling break? Generally, you should keep close watch on the pit level to catch any change in level and mud returns or evidence of gas cuttings. Bell[1], in his discussion of blowouts, shows that gas cutting rarely indicates an imminent blowout. Even 18-lb. per gal. mud cut to 9 lb. per gal. means less than 100-psi. reduction in bottom-hole pressure at 10,000 ft. (see Fig. 1).

Usually, gas cutting means one of two things: First, the formation penetrated contains gas; and, as it is drilled, a certain volume of gas enters the bore hole from that section removed by the bit. Quite possibly it could mean that only a small overbalance existed.

Second, a section of very low permeability or a very small section has been opened. These are usually called high pressure—low volume sections; it could be shale gas. In either case it is hardly likely that the well will blow out while circulating if reasonable precautions are taken; i.e., pit level is watched to see if mud is being gained.

Time lost. Time spent in circulating out each drill break can be reduced—if not eliminated completely—unless it is desirable to circulate cuttings out before drilling continues. Actually, a gain in mud volume—not gas cutting—indicates that the well is coming in. If the well will flow, it will do so as soon as the higher-pressure formation is penetrated. Therefore, the best procedure to follow is:

As soon as a break is hit, shut down the pump and check the well to see if it is gaining fluid. If so, the well will continue to flow with the pump off; if not, mud returns will stop completely. Should returns continue without the pump but no mud is gained with the pump on, no more than 0.4-lb. per gal. increase in mud weight is needed to balance the formation. This will be proved in a later section on "Flow Rates Due to Kicks."

Should the gain persist with the pump on, close the well in and use the method given later in a discussion of "Killing Threatened Blowouts." Should flow cease when the pump is shut down, no change should be made in the mud and drilling should continue.

Since a drilling break indicates that at least a portion of the overbalance has been lost, the well should be checked before pulling out of the hole to change bits, etc., to make sure that it does not swab. This can be done very easily by making a "short trip." That is, several stands of pipe are pulled and the bit run back to bottom, then the well is circulated out. If

TABLE 2—ANNULUS PRESSURES WHEN VARYING VOLUMES OF FORMATION FLUID ENTER BORE HOLE

Well depth (ft.)	Mud weight lb./gal.	Mud Wt. required lb./gal.	P_{dp}	P_a for the following vol. gained, bbl. 25	50	100	150	200	Initial flow rate (bbl./min.)	Fluid	Hole size (in.)	Drill pipe size (in.)
10,000	10	12	1,040	1,250	1,470	1,900	2,300	2,700	41	Gas	9⅞	4½
10,000	10	12	1,040	1,075	1,110	1,180	1,250	1,320	41	Water	9⅞	4½
6,000	10	12	624	670	720	813	910	1,005	27.5	Gas	8½	4½
15,000	16	17.5	1,065	1,485	1,900	2,325	2,750	3,175	17	Gas	8½	4½
15,000	16	17.5	1,065	1,275	1,485	1,700	1,900	2,100	17	Water	8½	4½
15,000	14	16	1,560	2,170	2,780	4,000	5,220	6,440	7.8	Gas	6	3½
15,000	14	16	1,560	1,820	2,080	3,600	4,120	4,640	7.8	Water	6	3½

P_a is annulus pressure, psi. P_{dp} is drill pipe pressure, psi.

there is any tendency to swab, the hole will fail to take the proper amount of mud or a severe kick may be noted when circulating out after the short trip.

Should the well tend to swab, mud properties may be changed without raising weight and eliminate the condition; if not, the weight can be raised 0.1 or 0.2 lb. per gal.

We gain several things from this approach. We avoid raising mud weight unnecessarily, thus preventing further decreases in drilling rate. Less time is lost circulating out breaks. Control of the well is much better since the crew knows exactly what to expect from the well. Making the short trip reduces tremendously the possibility of the well coming in during a trip.

Flow Rates Due to Kicks

The severity of a kick or threatened blowout depends on three things: pressure of the formation fluids; difference in this pressure and that in the hole; and length of time formation fluids flow into the hole. These three factors combine to determine how much fluid the well makes and pressure at the surface.

As we shall see later, it is easy to figure the total bottom-hole pressure and pressure differential from the drill-pipe pressure.

Inflow rate of formation fluids is controlled by pressure differential, formation permeability, and annular friction drop. Most abnormal-pressure zones are permeable enough that the ability of the formation to produce does not control the flow rate, but rather the other two factors.

However, there are formations too tight to produce more than relatively minor kicks or possibly just gas cutting. Such a well would not show a gain at the rate indicated and will not generally kick while drilling is in progress. At any rate, the pressure differential and annular friction drop are of vital concern.

In a formula. Here are a few calculations which shed light on the problem. Knowing mud weights and pressure differentials, initial flow rates can be determined from the formula[3]:

$$P = \frac{.000086\,\rho\,LG^2}{(D_2-D_1)\,(D_2^2-D_1^2)^2} \qquad (1)$$

or, in its rearranged form:

$$G = \left(\frac{P\,(D_2 - D_1)\,(D_2^2 - D_1^2)^2}{8.6 \times 10^{-5}\,\rho\,L}\right)^{1/2}$$

wherein:

G = flow rate, g.p.m.

P = pressure drop, psi., per 100 ft. less pressure differential causing flow = $P_f - (P_m + P_{ca})$.

ρ = density of mud in hole, lb. per gal.

L = length of annulus, ft.

D_1 = minor diameter of annulus, in.

D_2 = major diameter of annulus, in.

Using Piggott's[4] formula for annular pressure drop and 9.5 lbs. per gal. mud, the rearrangement becomes:

$$G = \left(\frac{P(D_2 - D_1)\,(D_2^2 - D_1^2)^2}{0.0814}\right)^{1/2} \qquad (2)$$

Let us assume annular velocity is 140 ft. per minute and that hydrostatic pressure of the mud exactly equals formation pressure before the kick. We can calculate rates of inflow of formation fluid for various pressure differentials and for different sizes of hole and drill pipe.

We may calculate pressure differential on the basis of pounds per gallon mud density and P in psi. per 100 ft. Then, by first determining the pressure loss in the annulus due to circulation at 140 ft. per minute, we can find that portion of the pressure differential that can cause additional flow. Then we may calculate the rate of flow it will produce.

A sample case. Following is a sample calculation of the rate of inflow: A 9⅞-in. hole is being drilled using 4½-in. o.d. drill pipe and 10 lb. per gal. mud. Annular velocity is 140 ft. per minute and circulating rate is 440 g.p.m. Abnormal pressure equal to 1 lb. per gal. mud weight above the hydrostatic pressure of the mud is drilled.

The pressure loss in 9⅞ by 4½-in. annulus is 0.6 psi. per 100 ft., and pressure differential due to abnormal pressure is 5.2 psi. per 100 ft. The remaining excess differential is 4.6 psi. per 100 ft. Then:

P = 4.6 psi. per 100 ft.

$$G = \left(\frac{(9.875 - 4.5)\,[(9.875)^2 - (4.5)^2]^2\,4.6}{0.0814 \times 10 / 9.5}\right)^{1/2} \qquad (3)$$

$$G = (1.72 \times 10^6)^{1/2} = 1.32 \times 10^3 \qquad (4)$$

Using this method, calculations were made at various mud weights and hole sizes. Result is the curve in Fig. 2. Table 1 contains selected data from Fig. 2 with other pertinent data. Notice in Table 1 the terrific increase in annular flow rate caused by excess pressure.

Although the curves and table have no particular value in actual control of a well, they do point out several interesting conditions. For example, the intercept on the vertical axis is equivalent to the mud-weight differential which causes a flow of 1 bbl. per minute into the hole. In every case that mud weight is within 0.1 lb. per gal. of that which will **not** cause flow (Column 5, Table 1), so long as circulation continues at an annular velocity of 140 ft. per minute.

Note that in most conditions of hole and drill-pipe size and with 10-lb. per gal. mud, formation fluid will not flow into the hole while circulating when formation pressures are 0.15 lb. per gal. in excess of static bottom-hole mud pressure.

Consider the case where annular area decreases or mud weight increases. Then, the formation-to-borehole pressure differential ($P_f > P_m$) required to cause flow (while circulating) increases. This is shown by curves 1, 4, and 5 in Fig. 2. Curve 1 is based on 9⅞-in. hole, 4½-in. drill pipe, and 10-lb. per gal. mud. Curve 5 is based on 6-in. hole, 3½-in. drill pipe, and

10-lb. per gal. mud. Curve 4 is based on 6-in. hole, 3½-in. drill pipe, and 10-lb. per gal. mud. Curve 4 is based on 6-in. hole, 3½-in. drill pipe, and 14-lb. per gal. mud.

Each case (except 12¼-in. hole, 5-in. drill pipe, and 10-lb. per gal. mud, and this one would be very close), requires an increase in pressure-differential of more than 0.1 per gal. to start flow. One (curve 9) requires almost 0.5 lb. per gal. to start flow.

Very few formations have pressure equivalent to a gradient exceeding 0.95 psi. per ft. (18.3-lb. per gal. mud weight). Thus, no well drilling with the conditions in curve 10 (8-in. hole, 3½-in. drill pipe, 18-lb. per gal. mud) could blow out while being circulated.

Little extra needed. For all curves shown, no kick requiring an increase of more than 0.5 lb. per gal. can be killed by the circulating annular pressure drop and the well must be closed in. In most cases, 0.1 to 0.25 lb. per gal. is the maximum mud-weight differential that can be overcome by circulating with the well open. Hence, the well must be closed in if it is gaining mud while drilling.

Fig. 3 shows the effect of annular area, initial mud weight, and differential pressure on the flow rate.

Suppose that mud weight is just light enough that the formation can start to flow. A mud weight only slightly less than this allows a very large flow from the formation. You can see this in Table 1. Notice in column 7 what circulating rate must be in various hole sizes for 140-ft. per minute annular velocity. Now compare this with columns 8, 9, and 10. These show how much the formation will flow if its pressure is greater than the bottom-hole mud pressure by an amount that corresponds to 0.5 or 1.0 or 2.0 lb. per gal.

What else do the figures in Table 1 show? This: Suppose formation pressure is greater than bottom-hole mud pressure an amount equal to 1 lb. per gal. The resulting rate of gain in fluid would cause a noticeable change in pit level within only a minute or so if hole size is large.

On the other hand, take the case of a small hole (say 6-in. with 3½-in. drill pipe) and a large mud pit. Say the pit has a capacity of 10 bbl. per inch. There's a kick that requires as much as 2 lb. per gal. more mud weight to handle it. Pit level will rise less than an inch the first minute. Column 13 of Table 1 shows this. Yet, during that same minute, 400 ft. of the hole will be filled by formation fluid as column 12 shows.

Weight, pit size. The above facts show two things. First, we have very few kicks which need more than 1 lb. per gal. more mud weight to control them. If this were not so, we would have terrifically high flow rates on kicks. It is quite rare to see the flow rates that would be caused by a kick requiring 2 lb. per gal. more mud weight.

Usually, there is too much lapse between the time the high-pressure formation is drilled and the time that the crew realizes the well is making fluid. This is why mud weight is often raised more than 1 lb. per gal. Likely, most kicks require only 0.2 to 0.5 lb. per gal. more weight to balance formation pressure. Any increase in mud weight beyond this is, intentionally or not, a "safety factor."

Apparently, this safety factor may sometimes be as much as 2 to 3 lb. per gal. This excess, coupled with several other factors is the cause of the loss of circulation that so often accompanies killing of a threatened blowout. The other factors leading to loss of circulation are the higher pressure surges that come with higher-weight mud, inaccurate weighing of mud as a result of gas cutting, and poor control of the well pressure.

Second, size of the active mud pit should depend on size of hole being drilled and size of the drill pipe being used. If desired, extra mud can easily be kept on location. But, here are reasonable pit sizes for several ranges of hole size:

Hole size, in.	Drill-pipe size, in.	Mud-pit capacity, bbl. per in.
12¼	4½ or 5	10 to 15
9½ to 12¼	4½ or 5	10
7½ to 8½	4½	5
6 to 7	3½	2½

Close preventers quickly. Probably the important thing to learn from the flow rates shown here is: It is imperative that the blowout preventers be closed as rapidly as possible when a well is closed in; it should then be opened on a suitable choke rather than be gradually pinched down.

The examples in Table 2 illustrate this. With no more than 1 lb. per gallon mud-weight increase required, in a matter of 3 minutes, high pressure can build up on the annulus. Even in a shallow well, pressure can be above 1,000 psi. 5 minutes after a gas kick; and, in killing the well, it will be necessary to allow gas in the annulus to expand and permit the annulus pressure to rise somewhat. It is quite possible that, if sufficient foreign fluid enters the hole before the well is closed in, annular pressures may exceed either the formation-breakdown strength or the working pressure of the blowout preventers.

When the well is deep and there is little open hole, the high pressure shown in Table 3 may well cause leaks in blowout preventers that have not been properly tested.

The ideal thing is to close the well in before any mud is gained—and although this cannot be done, it can be approached. If the pit is a proper size for the hole size, or if a good mud meter is in use, the driller will know within a minute when fluid starts to enter the hole. He will know the blowout preventers must be closed. No more than 1 minute should be required to close the well in. There is little time or trouble loss in reopening the well and resuming circulation if the precaution proves unnecessary. This would be easier than trying to overcome the pressure increase caused by an extra 50 to 100 bbl. of formation fluid flowing into the well.

TABLE 3—MUD REQUIRED TO CONTROL WELL WITH PIPE AT DEPTH SHOWN
(Pipe pulled from 15,000-10,000 ft. and returned to depths shown)

Depth (1,000 ft.)	Mud Weight Required at % Volume Swabbed* %				
	5	10	25	50	100
10	15.4	15.8	16.9	18.8	22.5
11	15.4	15.7	16.7	18.4	20.5
12	15.3	15.6	16.6	18.1	18.7
13	15.3	15.6	16.5	17.2	17.2
14	15.3	15.5	16.1	16.1	16.1
15	15.0	15.0	15.0	15.0	15.0
Mud pressure lost, psi.	200	400	1,000	2,000	4,000

*Assumed foreign fluid has no appreciable density.

References

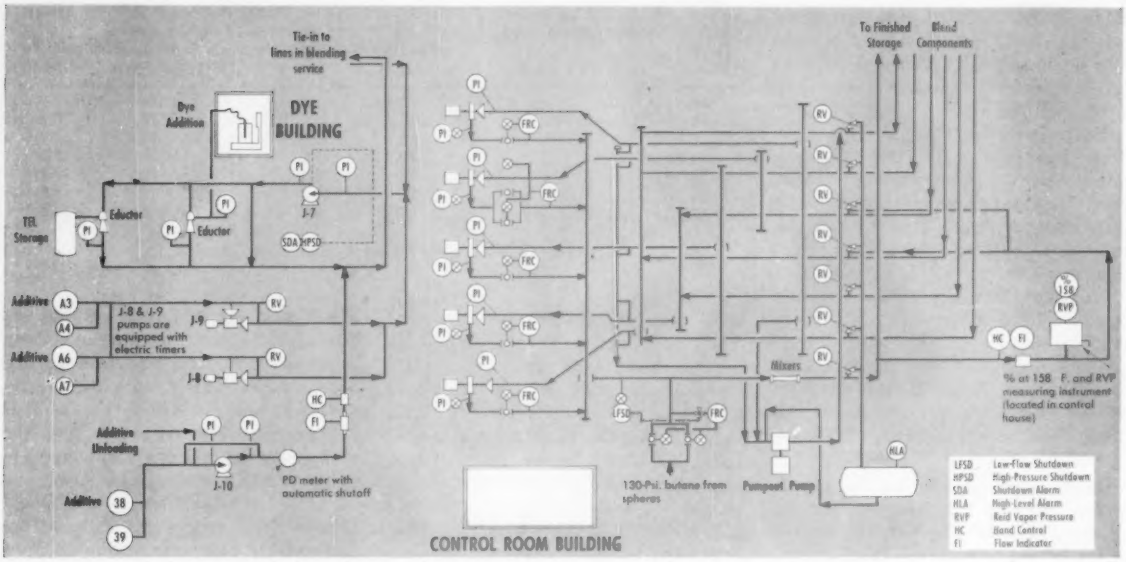
1. Bell, F. S., "High-Pressure Drilling and Blowout Preventers": The Oil and Gas Journal, Vol. 55, No. 41, 139, Oct. 14, 1957.
2. Farmer. B. and Jones, M., "Preventers in Theory and in Practice": Oil Forum, Vol. 11, No. 7, 237, July 1957.
3. "Hydraulics in Rotary Drilling," Hughes Tool Co., Houston, revised October 1958.
4. Piggott, R. J. S., "Mud Flow in Drilling": Drilling and Production Practice, 91, 1941.

Bibliography

Evans, Y. J., "Blowouts": The Oil and Gas Journal, Vol. 56, No. 21, 103, May 26, 1958.

Gaines, T., "Blowout Prevention": Petroleum Engr., Vol. 29, p. E-28, February 1957.

McGhee, Ed, "Gulf Puts System into BOP Testing," The Oil and Gas Journal, Vol. 56, No. 32, p. 95, Aug. 11, 1958.



BLENDING FACILITIES at Standard of Indiana's Wood River refinery. Fig. 1.

Only a short time ago gasoline blending was considered a relatively simple operation. But if you've ever had trouble getting a blend tank to meet specifications, you probably have other ideas. Standard of Indiana overcame some of these problems by

Automation for gas blending

BY H. H. SISK
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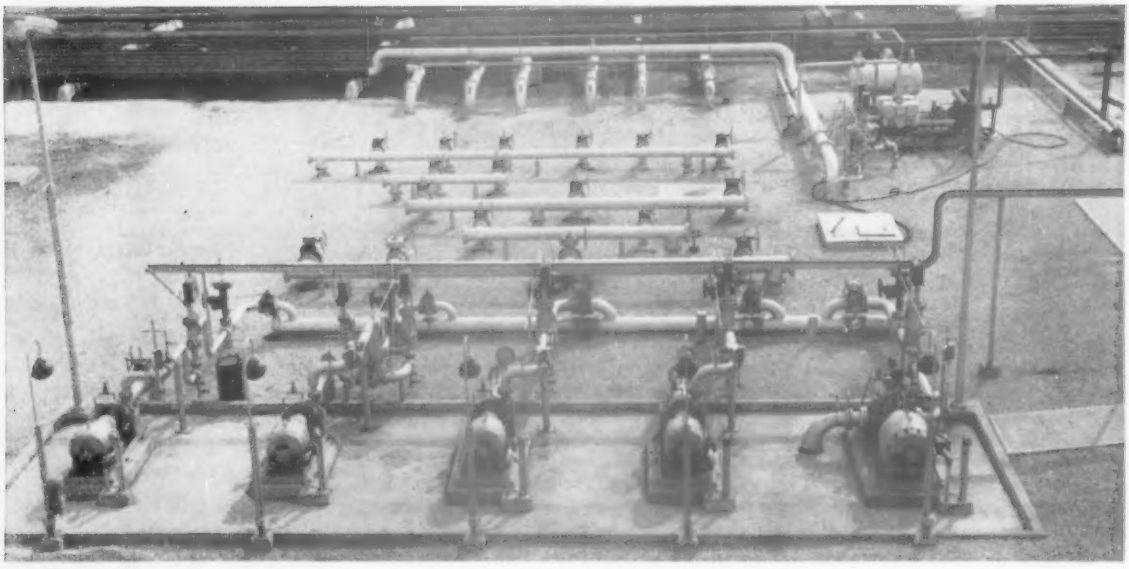


COMPONENT SUCTION LINES of 8, 10, and 12-in. size enter the blending manifold from the pipe alley. Upstream from an in-line mixer, butane enters the 12-in. discharge line in the area of the reciprocating pumpout pump. Fig. 2.

INSTALLATION of a new gasoline-blending system at the Wood River, Ill., refinery of Standard Oil Co. (Indiana) has replaced the "batch" method for blending gasoline with a new multicomponent system of increased capacity. The new system includes the features so necessary to integrate blending with other modern refining processes.

Since midyear 1959, when the expansion was completed, about 10 million barrels of gasoline have been blended. The new system provides:

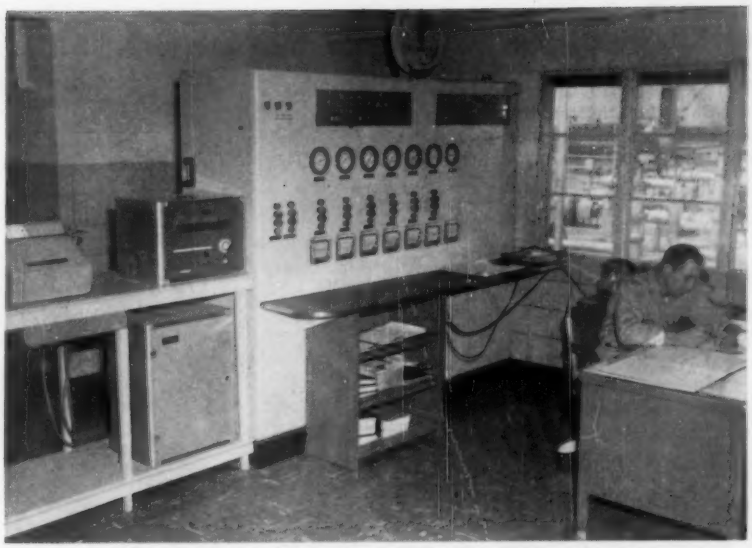
Blending flexibility. Additional pumping capacity, coupled with improved controls and procedures, has greatly reduced the time required for blending. As an example, a blend of 30,000 bbl., which previously required 36 hours for completion from the time the pumping began until the blend was approved, now requires about 15 hours. Pumping time for this volume blend has been reduced from 20 hours to 6 hours.

Experience has shown that normal operating difficulties and short periods of downtime can be handled without delaying shipments or uneconomical blending to meet shipments. Also, frequent changes in specifications for special blends have been made with no difficulty.

Elimination of uneconomical blending. Consistent and close approach to specifications hinge largely on the reliability and accuracy of component data and, in this respect, a three-tank system for storage of components has proved invaluable. Blend data show that approaches to vapor pressure, volatility, lead-level and octane targets have improved, and the estimated yearly savings is $250,000. Computer analyses of actual blends have shown no penalty because of uneconomical blending.

Improved use of manpower. About 40 man-hours were previously required to prepare a 30,000-bbl. blend by the batch method. Only 5 man-hours are now required. This reduction is a direct result of automation. Three of the 5 man-hours are now required to make field lineups at the beginning and end of the blend and to add TEL, dye, and additives. Gaging and sampling during the course of blend required about 2 man-hours.

Improved use of storage capacity. Storage of gasoline components rather than finished stock is now possible with the increased pumping capacity of the multicomponent system. Finished tankage is still required to allow blends to be sampled and approved for shipment; however, this capacity can be relatively small. The reduction in finished tankage requires less inventory of TEL, dye, and additives; reduces loss of lightends, and lowers the maintenance cost of tankage used in finished gasoline containing TEL.



BLENDING CONTROL PANEL. Pump discharge-pressure gages, start-stop switches and recorder-controller instruments are shown for each of the six blending components. Vapor-pressure and volatility recorder is at the right of the component instruments. High-liquid-level alarms for 160 tanks are grouped across the top. Automatic gage receiver and printout device are shown at the left of control board. Fig. 3.

Improved safety. Use of remote gaging devices, better communication equipment between field and pumphouse personnel, and automatic blending devices have reduced the inherent hazards of blending.

Why Change Blending Method?

Typical of most refineries, growth and development at Standard's Wood River refinery have been reflected in the increased yield and the improved quality of motor gasolines. In 52 years of operation the yield of gasoline from crude at the refinery increased from about 15 to 50%.

Since World War II, quality improvements in gasoline have been signigicant. Production of higher-octane components from new catalytic reforming processes and increased alkylation has been necessary to supplement the use of TEL to meet new octane goals. Also during this period, seasonal balancing improved and extensive use of additives for special purposes, such as corrosion, icing, and preignition control, began.

These yield and quality demands have been satisfied, for the most part, by modest improvements in blending equipment and procedures.

Before 1959, the batch method of blending gasoline was still in use at Wood River. This system required the addition of individual components, one after the other, into a blending tank. TEL and additives were then added singly. This blending was followed by a sequence of mixing, sampling, and laboratory testing. Final approval for shipment often required remixing, resampling, and retesting.

Although capacity of the batch system had been increased from time to time through addition of lines, pumps, and tanks, these facilities had been added to meet short-term blending and shipping commitments without a long-range plan for expansion.

The earliest application of automatic equipment for batch blending was made in 1947 when automatic Reid-vapor-pressure analyzers developed by the company's engineering research department were installed to monitor the preblending of butane into "heavier" components.

At the outset of the expansion and modernization program at Wood River, evaluation showed that a major change in existing blending facilities would be required to meet a 45% increase in gasoline shipments.

Because of the inherent limitations of batch blending, an economic study of this problem was undertaken to determine the best blending system for the expanded refinery, making maximum use of existing equipment and satisfying these objectives:

1. Increase the blending rate to satisfy the refinery expansion with sufficient reserve capacity for reasonable future expansion.

Experience had shown that a system which required almost continuous operation to meet normal gasoline budgets was seriously undersized. With such a system, normal operating problems such as equipment failures, shortage of components, off-test components, special blends, peak shipments and "spiking" or reblending, frequently made it necessary to resort to uneconomical blends to meet shipping schedules.

2. Incorporate improved instrumentation and automatic controls to insure a close approach to vapor-pressure, volatility, octane, and lead-level targets. Also, separate and isolated tankage for each blending component was considered necessary to best use high-cost premium-octane components and to obtain more reliable component data for calculating blends.

3. Improve transportation and communication to better use manpower and to improve the safety of blending operations.

Evaluation of these objectives revealed that the cost of expanding these batch-blending facilities to meet new gasoline demands was prohibitive. Furthermore, the batch system would not lend itself to the automation necessary to achieve the desired improvement in quality control, manpower efficiency, and safety.

A multicomponent blending system with a nominal capacity of 5,000 bbl. per hour was found to be the most economical method.

New Blending System

A layout of the blending facilities for the multicomponent system is shown in the plot diagram (Figure 1). Approximate physical location of tanks, lines, pumps, and additive facilities is as illustrated.

A major portion of new equipment is shown inside the broken-line area; outside this area, new piping is represented by the heavier solid lines and existing piping by the lighter solid lines. A new control room building is located adjacent to the blending manifold, and a new dye building is located in the additive area.

Rundown and storage. Six components from crude, catalytic cracking, catalytic reforming, and alkylation are available for blending. Isolated lines, not shown in the diagram, permit each stream to be run down directly from the unit, through appropriate treating and sweetening facilities, into component tankage.

As illustrated, three storage tanks are provided for each of five components. The nominal capacity of these atmospheric storage tanks ranges from 15,000 to 30,000 bbl. The sixth component, butane, is stored in conventional pressure storage spheres.

TWO-WAY RADIO EQUIPMENT allows speedy communication between trucks in the field and pump house. Fig. 4.

Each atmospheric tank is equipped with an in-tank mixer, an automatic and remote gaging device, and a high liquid-level alarm Automatic gaging and liquid-level alarms are also provided for the butane spheres.

No new atmospheric vessels were required to establish the three-tank system for component storage since ample tankage was available. However, the service of some tanks was changed and a few tanks were relocated.

The storage capacity of each group of component tanks is used to get data on each stock before blending.

To do this, the service of each tank in each group is rotated so that at any given time one tank is filling, a second is being tested and a third is being used for blending.

Handling component storage in this manner has made it possible to get reliable inspection data independent of unit operations. This had never been possible with a single or even a dual-tank system. As a result, approach to target specifications has improved and reblending has been minimized.

Because of seasonal variations in gasoline specifications, production of certain components, particularly the lighter components, may fall short of or exceed blending requirements. During the summer months, for example, light-end stocks will normally accumulate, and the excess is placed in seasonal storage. Conversely, as blending requirements for light ends exceed production in the winter months, these stocks are returned from seasonal storage to component storage as needed.

Component blending. The photograph of the blending manifold (Fig. 2) shows the type equipment (lines, manifolding, pumps, and instruments) used for blending components simultaneously. Components enter the manifold through separate and isolated lines of 8, 10, and 12-in. size.

The manifold consists primarily of five pump-suction headers, five component pumps, and a 12-in. discharge line for the total blend. A rotameter and flow-control valve are located on the discharge of each pump. Butane enters the 12-in. discharge line through a rotameter and control valve from a centrifugal pump located at the spheres approximately 6,000 ft. from the manifold.

Component suction lines and pump-suction headers are manifolded to permit maximum use of pump and rotameter capacities. The layout of

the manifold provides ample room for the addition of new lines and pumps and for expansion of the manifold.

Improved efficiency, quality control, and safety of this phase of the blending operation are achieved through new instrumentation. These control features are as follows:

1. Remotely operated switches for starting and stopping the six blending pumps. These are located on the blending panel of the control room.

2. Rotameters and flow-control valves for measuring and controlling the discharge from each component pump into the 12-in. discharger header.

3. Combination Reid-vapor-pressure and volatility instrument to monitor continuously the vapor pressure and volatility of the total blend.

4. "Flow-no flow" switch on the butane system to prevent butane from being pumped inadvertently into an atmospheric tank during low-flow conditions (less than 1,500 bbl. per hour) in the 12-in. discharge header.

Fig. 3 shows the instrument panel for blending. Remote start-stop switches for the blending pumps, the flow-recorder-controller instruments, and the vapor-pressure and volatility recorder are located on this panel.

As shown in the plot diagram, the total stream from the blending manifold may be directed into one or more of 12 final storage tanks. Here again no new tanks were required and, for the most part, existing 8, 10, and 12-in. piping was used as transfer lines. Each finished tank is equipped with an in-tank mixer, an automatic gaging device, and a high liquid-level alarm.

Each blend is inspected and approved before shipment; therefore, the use of automatic equipment to proportion TEL, dye, and other additives into each blend entering a finished tank was not warranted. The batch method of injecting such additives was retained.

Additive blending. With the exception of storage vessels, the additive facilities (pumps, lines, and instrumentation) are new.

Increased capacity of the eductor-circulating pump and injection pumps now permit these batch operations to be completed in 30 minutes to 1 hour. This is well within the pumping time required for a normal blend.

Dry dye is educted from shipping cartons into the circulating gasoline stream. The quantity is accurately measured by scale weight. TEL is also educted from a conventional weight tank into the same circulating stream. Other additives are pumped into the circulation gasoline system, and the volume of each is accurately determined by positive-displacement meters.

Although batch addition of additives has been continued, current procedures represent a significant change.

Previously, these chemicals were added only to the smaller tanks after the component pumpings were completed and the tank was mixed, sampled, and tested. Approval for shipment then followed a second round of mixing, sampling, and testing. Frequent transfers of finished gasoline from the smaller tanks to larger-capacity shipping tanks required a third sequence of mixing, sampling, and testing.

Current procedure eliminates this duplication by blending additives directly into the desired shipping tank so that they are all present by the time that fillback is complete. One sequence of mixing, sampling, and testing accomplishes what two or possibly three did previously. Guided by reliable TEL-requirement data for each component, the new procedure has given a close approach to octane targets and lead levels with less frequent reblending or "spiking."

This new over-all blending operation produced many changes in operating procedures. A typical stepwise procedure is as follows:

1. A mathematical blend is calculated, based upon the daily inspection data on each component. Model blends are also available from computer analyses to guide the optimum use of components.

2. From the calculated blend, an order is issued to the blenders specifying the total volume of the blend, the rate and flow-recorder-controller setting for each component, the vapor-pressure and volatility targets, and the amount of TEL, dye, and other additives required.

3. The piping and valving changes are then made in the field to route properly individual stocks from the component tanks through the manifold, to the rundown tank. The blender records tank gages, starts all blending pumps and promptly sets the desired rate of flow for each component.

A satisfactory volume balance between the components and the total blend is established as soon as possible. This is based on changes in tank gages and the flow-recorder-controller rates.

4. During the course of the blend, pumping rates are frequently checked, and the pumper makes minor adjustments to maintain the desired R.v.p. and volatility values. TEL, dye, and other additives are added to either the rundown line or tank in the field.

5. When the finished tank is filled to the desired height, the pumper stops all pumps and secures the field lineup. The finished tank is then mixed and sampled for final approval.

"About 50% of the production time for a field operator was spent walking from one job assignment to another."

The blending of gasoline is only one of many operations performed by the blender and the other personnel located in this blending pump house. All oil movements outside the battery limits of units are also the responsibility of this pump house. Before modernization, all of these activities were handled by two pump houses, but adoption of the continuous-gasoline-blending system, as well as other improvements, reduced this requirement to the one pump house. The principal features incorporated in this new blending pump house, exclusive of the gasoline-blending facilities, are:

Tank gaging equipment. Almost all light oils tanks, approximately 160, have automatic gaging equipment and high liquid level alarms. Feed tanks for units and tanks containing heating coils are also equipped with low-liquid-level alarms. The gage receiver and the alarm panel are housed in the central pump house.

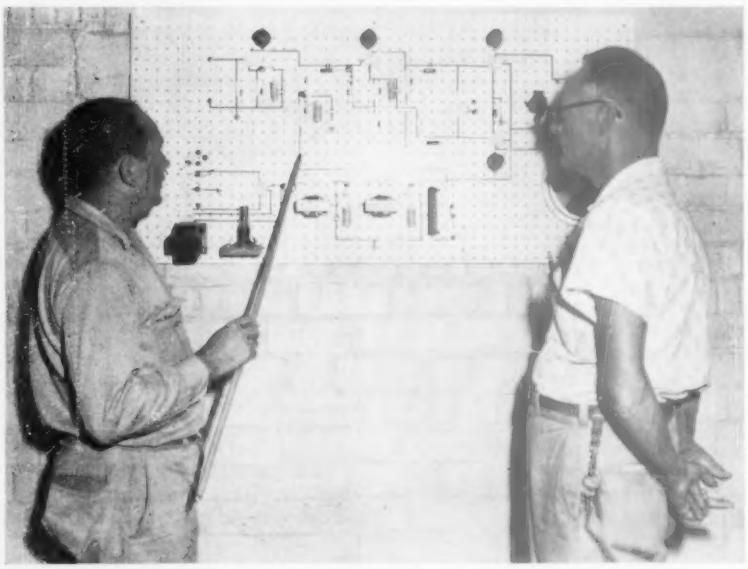
Automatic printout device. This equipment, which includes a punch-tape attachment, provides a printed record of all tank gages and is normally programed to perform this 15-minute operation every 2 hours. The punch-tape record can be transferred to a computer, and programed to convert gages from feet and hundredths of feet to barrels or gallons for accounting purposes.

Transportation and communication. Efficiency and safety in pump-house operations are largely dependent upon the methods of transportation and communication. Manpower studies previously had shown that about 50% of the production time for a field operator was spent in walking from one job assignment to another. Such inefficiencies are minimized by the assignment of a truck to each field operator. Two-way radio equipment in each truck (Fig. 4) and in the pump house provides rapid and convenient communication between trucks in the field and the pump house.

BY J. E. WILLIAMS
Training Superintendent, Pure Oil Co.,
Smiths Bluff Refinery
Nederland, Tex.

You can turn men into electronic

When the need for electronics service men became evident, one plant decided to train its own personnel instead of hiring outside experts.



Demonstrations show how a job should be done.

CIRCUITS can be set up quickly and easily without soldered connections on masonite pegboard. Neater arrangement allows instructor to trace the circuit easily. Fig. 1.

Experiments show the principles involved.

MEN PERFORM experiments which illustrate the lecture material. Here they watch waveforms on an oscilloscope. Fig. 2.

INSTRUMENTS at Pure Oil Co.'s Nederland, Tex., plant are getting better service as a result of the company's training program in electronics. It has increased efficiency, improved the standard of work, and led instrument men to analyze the cause of equipment failures, rather than merely replacing parts.

Training is divided into four sections:

... **A film strip** and a discussion of electronics.

... **Basic electricity** and basic electronics.

... **Laboratory experiments.**

... **Simulation of problems** on plant electronic equipment.

Before entering this program each man has had both classroom and on-the-job training in instrument repair. In addition, he has taken a 40-hour course in "Elements of Petroleum Refining." The previous education and training of these people has better prepared them to receive and understand training in electronics. And we train not only our instrument men but also the helpers and a number of our engineers. Each group has benefited from studying together.

Film Strip. The film strip on electronics was developed by a major electric company. It is a 12-lesson course consisting of 2-hour sessions for each lesson. The course offers a practical and easily understood presentation of industrial electronics. The strip films describe the characteristics of various tubes and explain the fundamentals of electronics.

The subject matter is devoted to specific industrial application, showing both present and future possibilities. Technical terms are introduced in language which the learner can understand. An instructor's manual is available and provides the instructors with necessary information to teach the course.

Sound slide film of approximately ½ hour each provide the lecture material. The film can be rerun without the recorded sound for review and discussion. Completely illustrated book-

Paper presented to WPRA, Casper, Wyo.

instrument craftsmen

lets are provided for each subject. The booklets serve as reference material and for home study. A list of review questions in each book provides a check on the understanding of subject matter.

An extra session is held upon the completion of the twelfth session for a review of the course and a final test is given. The course serves as a motivating force for the courses to follow in basic electricity and electronics and in advanced electronics on our special equipment.

Following is a typical program as recommended for about a 2-hour session.

	Minutes
1. Review and clarification of questions from previous sessions	15
2. Introduction of new subject	5
3. Showing of sound slide film on new subject	20-30
4. General discussion	10
5. Review of film without record	25-35
6. Film quiz	10
7. Distribution of review booklets and assignment of home study	10

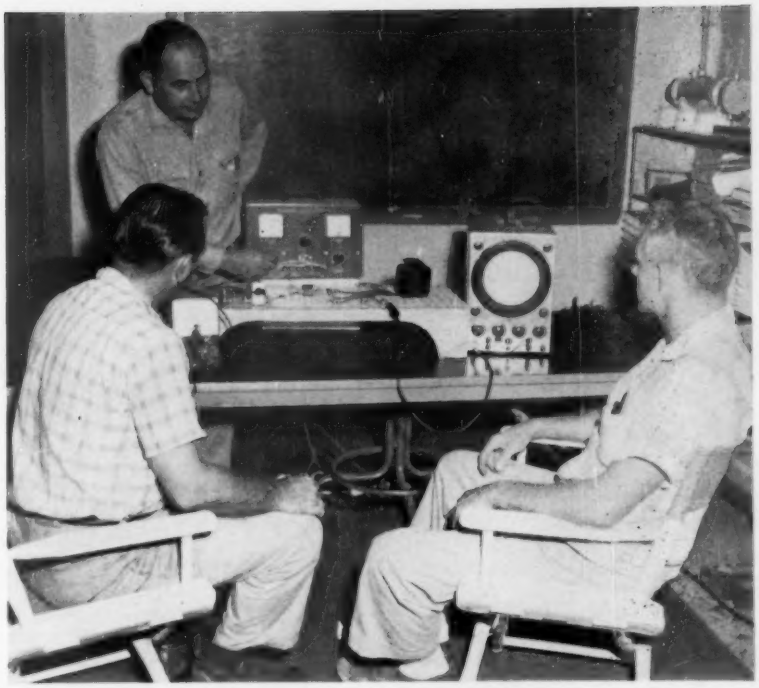
Electricity and electronics. Upon completion of this course the instrument men begin a basic electricity and electronics course using Van Volkenburgh, Nooger, and Neville texts titled "Basic Electricity"[1] and "Basic Electronics."[2] There are five volumes in each series. The texts have been used at Navy specialty schools since 1953. The plan of all volumes is to present one basic step at a time without getting too involved in complicated mathematics. Each concept is illustrated with exceptional clarity.

Considerable time is devoted to arithmetic, algebra, geometry, and trigonometry before beginning this course. We would recommend to anyone considering a course similar to this one to cover the mathematics first.

The 23 people attending this course were divided into 3 groups, and their sessions were staggered in order to maintain a normal working force in the plant.

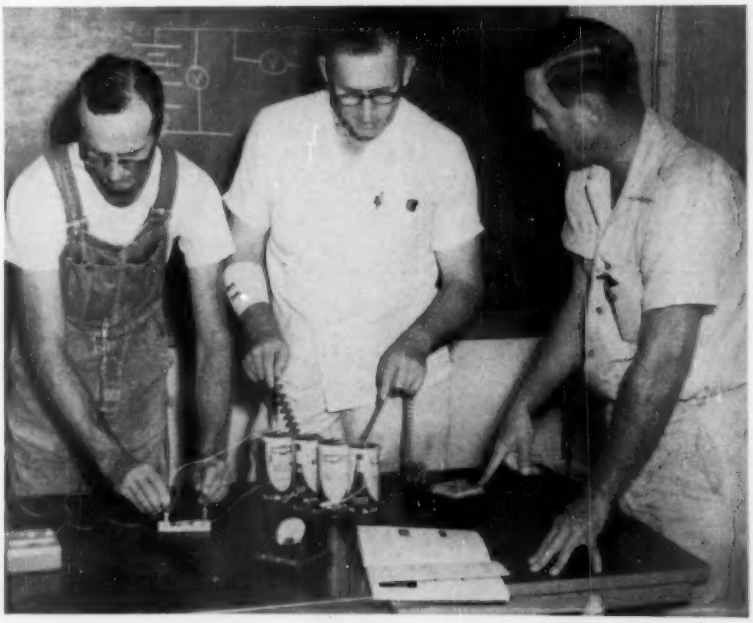
Group A attended a session. Group B attended the same session 2 weeks later, and Group C attended that session 3 weeks later. By arranging sessions in this manner those employes in Groups A and B would have an opportunity to make up sessions if they were absent because of sickness or vacations. Occasionally it was necessary to have makeup sessions for those employes in Group C.

Length of classes was 3 hours for each session. Throughout the course discussions and experiments took place



Lectures provide theoretical knowledge.

GRID-PLATE transfer characteristics of a vacuum tube are determined with this equipment. Fig. 3.



Practice makes for smooth proficiency.

IN ANOTHER EXPERIMENT voltage drops and current flow are checked in a d.c. resistive circuit. Fig. 4.

INSTRUCTOR DEMONSTRATES each experiment before it is performed by the class. Fig. 5.

"We believe we have accomplished a lot by this training program."

FINAL PHASE of training involves all of the equipment installed at the plant. Here the men check a vacuum tube. Fig. 6.

in the classroom. Each instrument man was provided a textbook and studied his assignment before coming to class. Classes were handled in the following manner:

1. Review and clarification of questions from previous sessions.
2. Lecture on new subject.
3. Demonstration of experiments.
4. Experiments performed by instrument men.
5. Summary of today's lesson.
6. Test.

Laboratory. Numerous aids and laboratory kits were used. Laboratory kits purchased for the electronics phase of the program were Allied Knight Radio Lab "10 Kits in One," Allied Knight "12 in 1 Electronic Lab Kit," and Heath Model PS-4 power supply kit.

The "12 in 1 Electronic Lab Kit" is, to the best of our knowledge, the latest that is available. The following devices can be built from the kit: audio-code oscillator, audio amplifier, broadcasting station, electronic flasher, broadcast receiver, photoelectronic relay, voice-operated relay, electronic timer, electronic switch, CW "transmitter," capacitance - operated relay, and light control oscillator. The manual for these projects consists of instructions for the learner, and both schematic and pictorial drawings are furnished for each project.

It was necessary to buy extra power-supply kits for further experiments, so we took advantage of the learning opportunity and assembled them in the refinery. While using these kits, various trouble-shooting situations were set up as problems for the instrument men to solve.

Another aid is a "breadboard trainer." These can be made locally or can be purchased. The trainers are made out of masonite pegboard with ⅛-in. holes laid out on 1-in. centers. The boards are approximately 30 in. in length, 14 in. wide, and 6 in. in height. They are portable and can be stored when not in use.

They have many other advantages: Circuits can be built up quickly without soldered connection; parts can be used over and over again; and the instrument men can always get a bottom view of his circuits and tube sockets.

Testing instruments used are: Oscilloscope, vacuum - tube voltmeter, signal generator (A-M), power supply, volt-ohm meter, tube tester, capacitance tester, audio oscillator, oscilloscope voltage calibrator, vibrator tester, signal tracer, resistor and capacitor decade boxes, and transistors tester.

The purpose of this third part of the course is to develop more skills in the use of test equipment and the repair of our electronic equipment. We set up 6 experiments in electricity and 20 experiments covering all phases of electronics. We used laboratory manuals for radio and television technicians titled "Basic Electricity," second edition,[3] and "Basic Electronics," second edition,[4] by Paul B. Zbar and Sir Schildkraut; an instructors' guide is also available.

These are excellent experiments and could be used in conjunction with the basic electricity and electronics course originally, if so desired. During these experiments we decided to divide the instrument men into smaller groups of approximately six and hold four classes each week. This was desirable since they were spending all their time on laboratory work. It also provided the instructor with more time to give individual instruction. Problem-solving experiments were developed to substitute for written examinations to test their skills and retention of knowledge.

Problem simulation. The final phase of training consists of laboratory work covering all the electronic equipment installed at our plant.

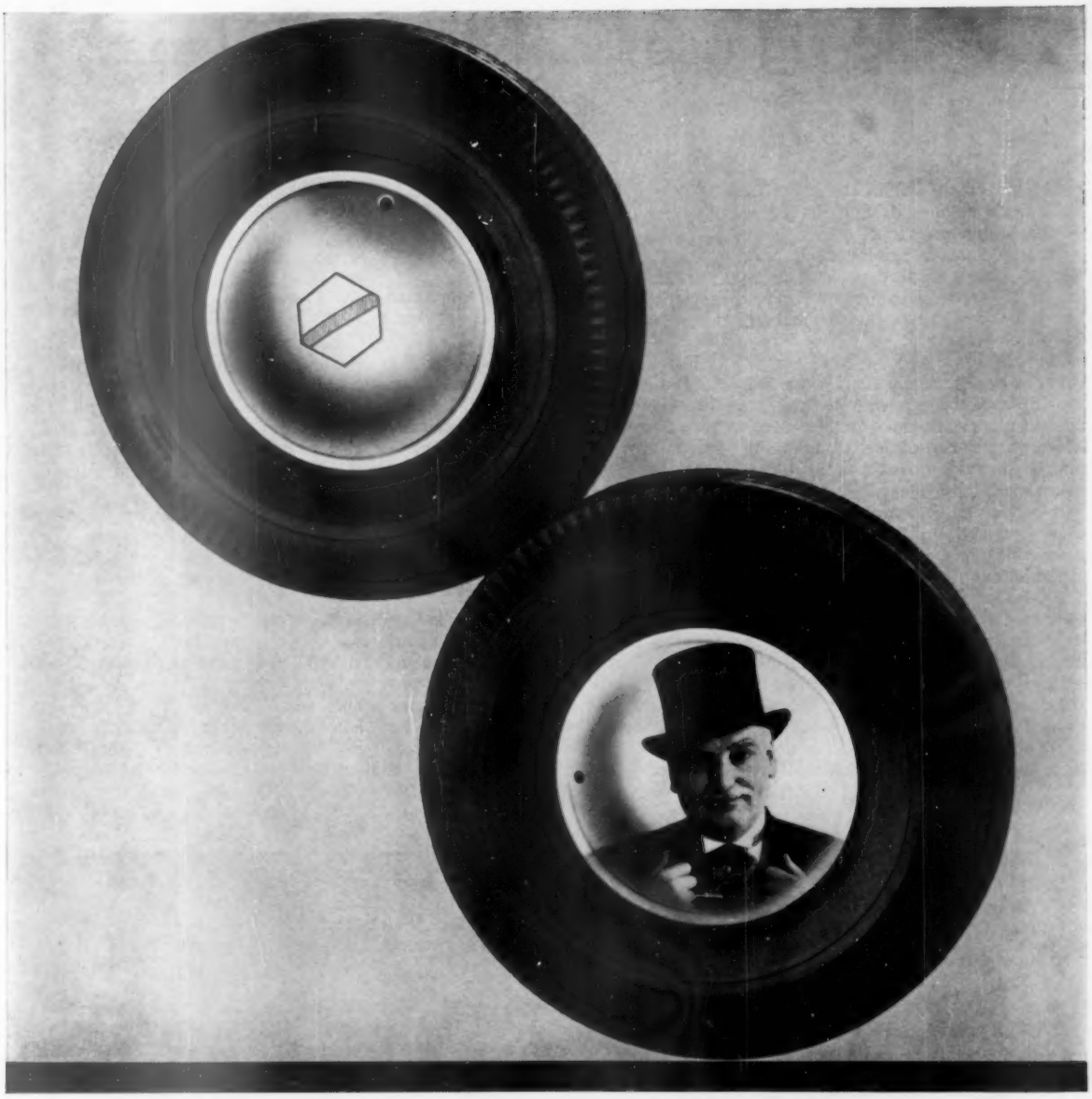
Technical manuals have been compiled into loose-leaf binders using service manuals obtained from manufacturers of electronic equipment. Each instrument man has a complete set for his use in classroom training and service repair work in the plant.

We believe we have accomplished a lot by this training program. We are confident of the knowledge our people have gained because of the results of a thorough testing program.

Some people with whom I discussed the program before starting the course said that we would be fortunate to have 50% of the men complete the course. Each of them has done an excellent job and the lowest average grade on all tests was above 75.

References

1. Van Volkenburgh, Nooger, and Neville, "Basic Electricity," New Orleans, John F. Rider, Publisher, Inc., 1955.
2. Van Volkenburgh, Nooger, and Neville, "Basic Electronics," New Orleans, John F. Rider, Publisher, Inc., 1955.
3. Zbar, Paul B., and Schildkraut, Sid, "Basic Electricity," second ed., McGraw-Hill, 1958.
4. Zbar, Paul B., and Schildkraut, Sid, "Basic Electronics," second ed., McGraw-Hill, 1959.
5. Zbar, Paul B., and Schildkraut, Sid, "Basic Radio and Radio-Receiver Servicing," second ed., McGraw-Hill, 1958.



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"And most of this capacity has gone on stream since 1957, based on a background of serving U.S. industry for over 15 years. It is also producing butadiene in Europe, and two additional units will go on stream in Europe and Asia this year."

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New big rig uses only two engines

By CARL HOOT
District Editor

MOST DEEP-DRILLING RIGS have three engines driving the draw works. Many have four.

Not so Penrod Drilling Co.'s new Rig 15. Here's a unit capable of drilling to 25,000 ft. with 5-in. drill pipe, yet it has only two engines driving the draw works.

By using only two engines, Penrod saves on maintenance. Rigging up and moving are cheaper with two larger engines than with three smaller ones. Moreover, a two-engine chain compound is cheaper than a three-engine compound. And Penrod feels that it gets better fuel economy with the two than it would on three smaller engines with the same total horsepower.

Admittedly, these are big engines—1,100-hp. each for hoisting—but Penrod isn't worried about losing half its horsepower when one engine is down. First of all, modern engines seldom go down without warning if they are properly cared for. Second, even if an engine does fail unexpectedly, odds are against this happening in a critical situation where one engine can't easily handle the load alone for a time.

From electric drive. Penrod's Rig 15 is the first modern rig on which the General Motors EMD diesels have been used for mechanically driving a rig. The same models, however, have been in servic for more than 4 years driving generators for electric rigs and for many years before that on railway locomotives.

Thus far, Penrod says the big diesels are working out to expectations for dependability.

Penrod's supercharged engines can supply 1,000 hp. each for continuous operation as for pumping. One of the rig's two mud pumps is V-belt driven off the rear of the rig-engine compound; the second is driven by a separate 1,000-hp. diesel skid-mounted with the pump.

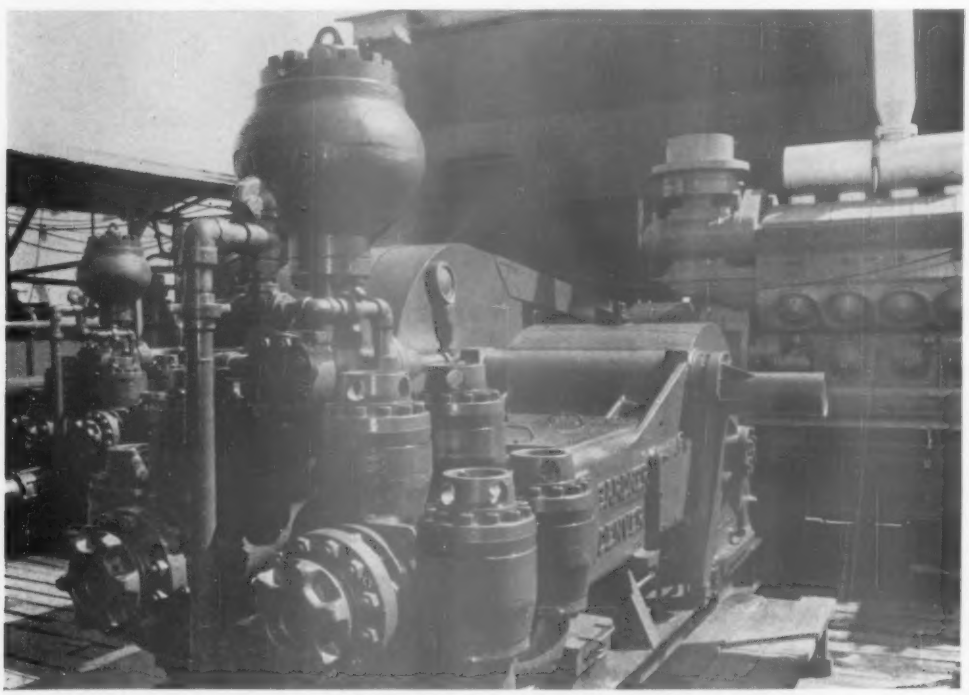
The big pumps are no luxury in South Louisiana's deep-drilling areas. High mud weight and long drill-pipe string put the pumps under a load of 3,000 to 3,200 psi. continuously for a period of 30 days on the first well.

Mud is not mixed with the big pumps nor with a standby piston pump. Rather, the rig carries two small engine-driven centrifugals for this job. Also, the steel mud tanks carry four electric agitators to keep the 700-bbl. of active-mud capacity well stirred.

A dual shale shaker and a 25-hp. desander (a newcomer to the Gulf Coast) remove troublesome solids carried out of the well in the mud.

Big draw works. Rig 15's draw works is Gardner-Denver's new model 2100; it is rated as deep as 30,000 ft. with 4½-in. drill pipe. When this unit was delivered, it was only the second ever built; the first is working for Jett Drilling Co., Shreveport.

The rig works under a 143-ft. Lee



BIG PUMPING PLANT features two identical mud pumps, the one in the foreground driven by its own engine and the one in the background driven off the drilling-engine compound. Smaller-engine-driven centrifugal pumps do mud-mixing chore.

CB&I CRAFTSMANSHIP IN STEEL

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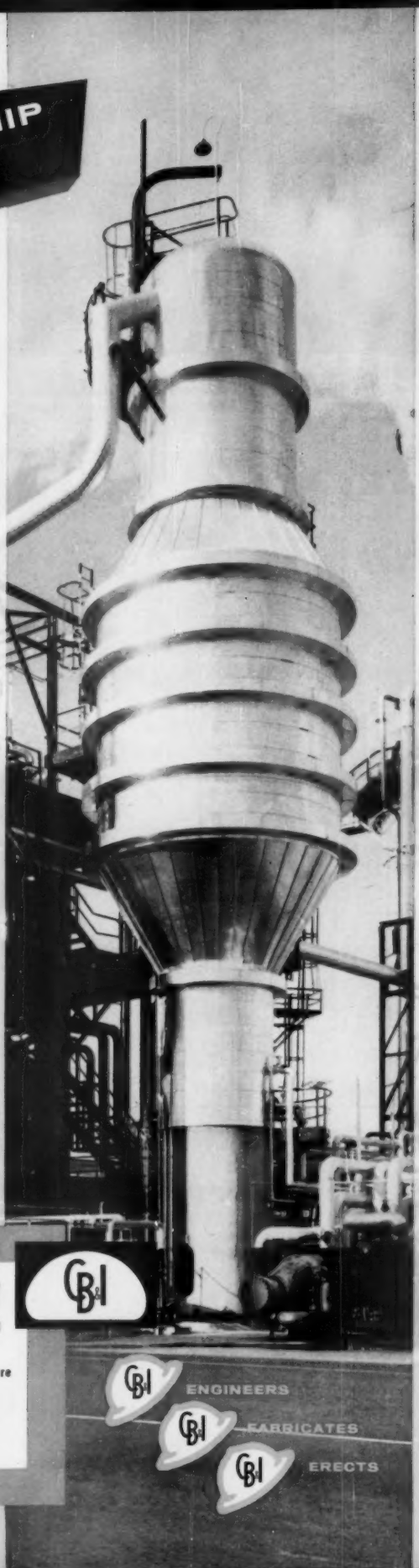
What is CB&I *Craftsmanship in Steel?* This unusual structure is a good example. It is engineering tempered with imagination. It is close attention to metallurgical control and structural detail. It is careful customizing of structure to process. Most important, it is *experienced coordination* through *all* phases of engineering, fabrication and erection.

These *coordinated services* are the reason why leading refiners rely again and again on CB&I for their critical tanks, towers and processing structures. For more information, write the nearest CB&I office, today. Ask for the brochure: *CB&I Craftsmanship in Steel.*

CB&I-built vacuum tower at El Paso refinery of Standard Oil of Texas. CB&I also built a reactor and regenerator, furnished through Fluor Corporation, Limited.



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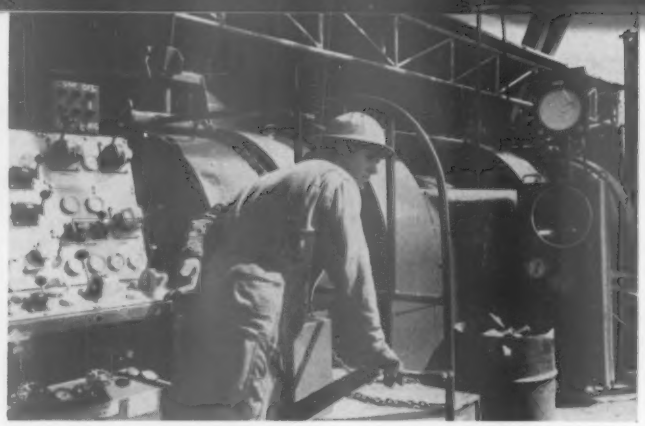
ONLY TWO ENGINES are used on a rig capable of drilling to record depths. These big diesels drive the draw works and one of the mud pumps. A third and identical engine drives the other mud pump.



NEW DRAW WORKS is one of first two ever built of its type. Here the driller operates the rig on its first location in South Louisiana. Having two engines instead of three or more simplifies control.

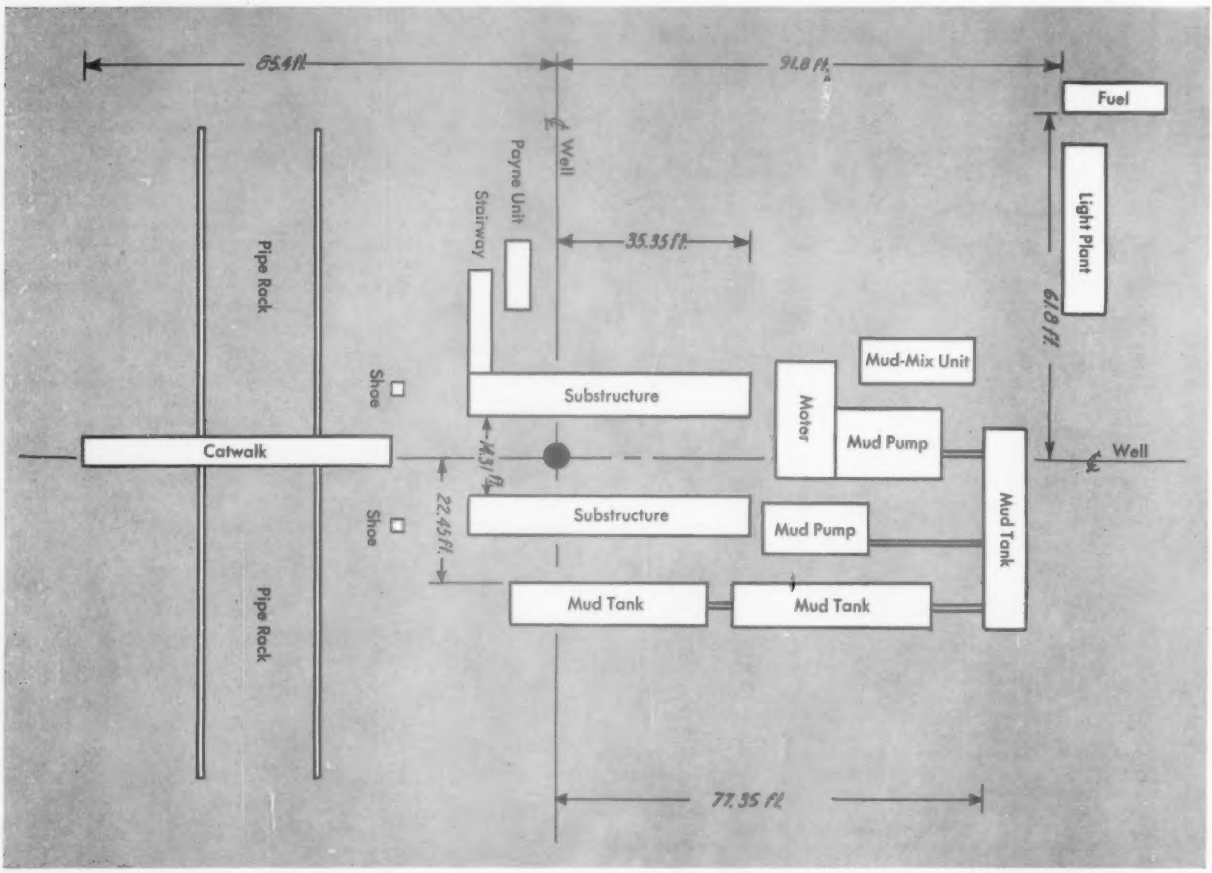
C. Moore portable mast with a gross capacity of 1,300,000 lb.

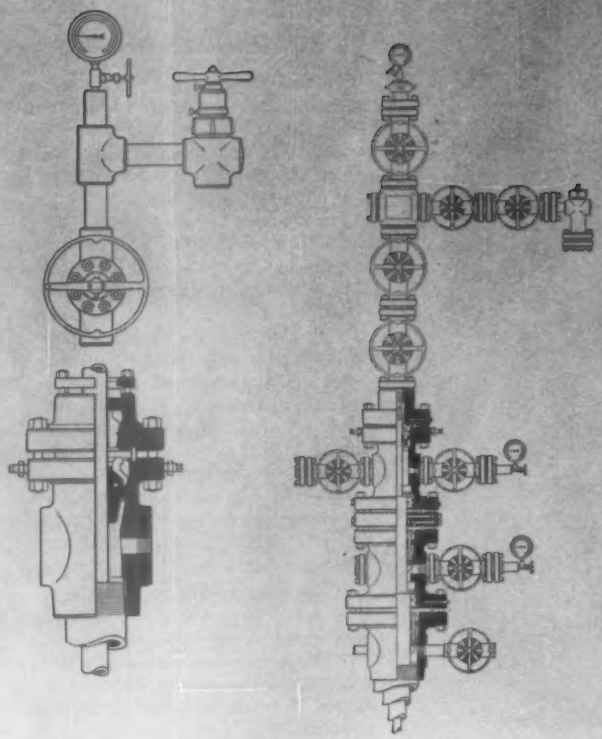
Penrod follows a set procedure for rigging up all its rigs and issues standard layout drawings for all crews so that every rig is set up in the same manner; all components occupy the same position at each location. Detailed drawings with all footages marked also are given to construction companies who prepare locations so that all units "fit" the site. Penrod feels that these extra details save up to 50% of teardown and rigup time.

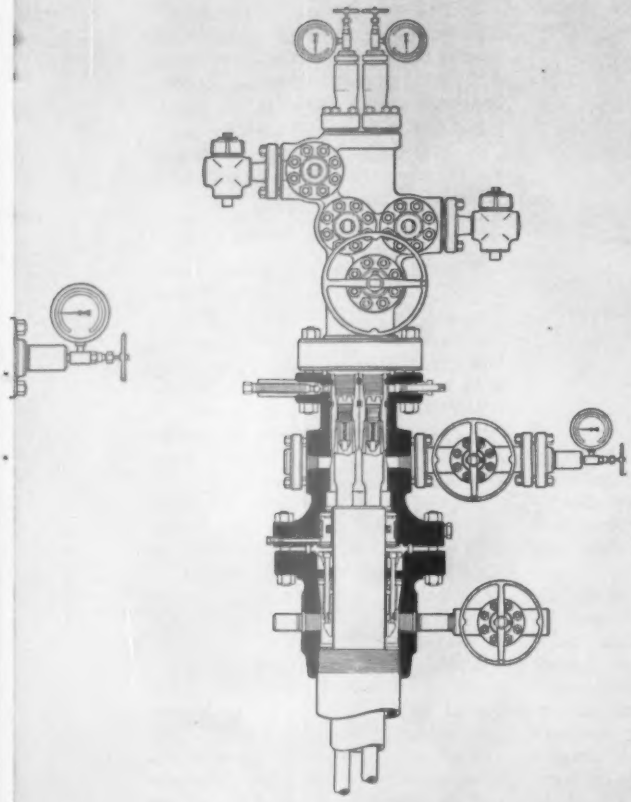
All of Penrod's new rigs have one two-engine skid and one combination pump-engine skid. Auxiliary power-generation sets and mud mixers are skid-mounted for faster rigging up. Rig moves vary with location condition and distances involved, but Penrod expects Rig 15 to move and spud in no more than 3 days normally. At its present location, the rig was set up in 2 days; approximately ½ day was required for making connections. Drilling was under way by 11 a.m. on the third day.

Penrod Rig 15 at this writing is on its second deep test, drilling for The California Co. in South Louisiana.

RIG LAYOUT is designed for good efficiency while drilling and for easy moves.







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WHOSE TREES ARE THESE?

It seems ambiguous, but the answers may surprise you. Ordinary trees composed of parts from several sources are a distinct disadvantage. They mean more connections, more parts, more weight and more confusion. Responsibility for performance is divided. Repairs mean parts must come from a variety of manufacturers.

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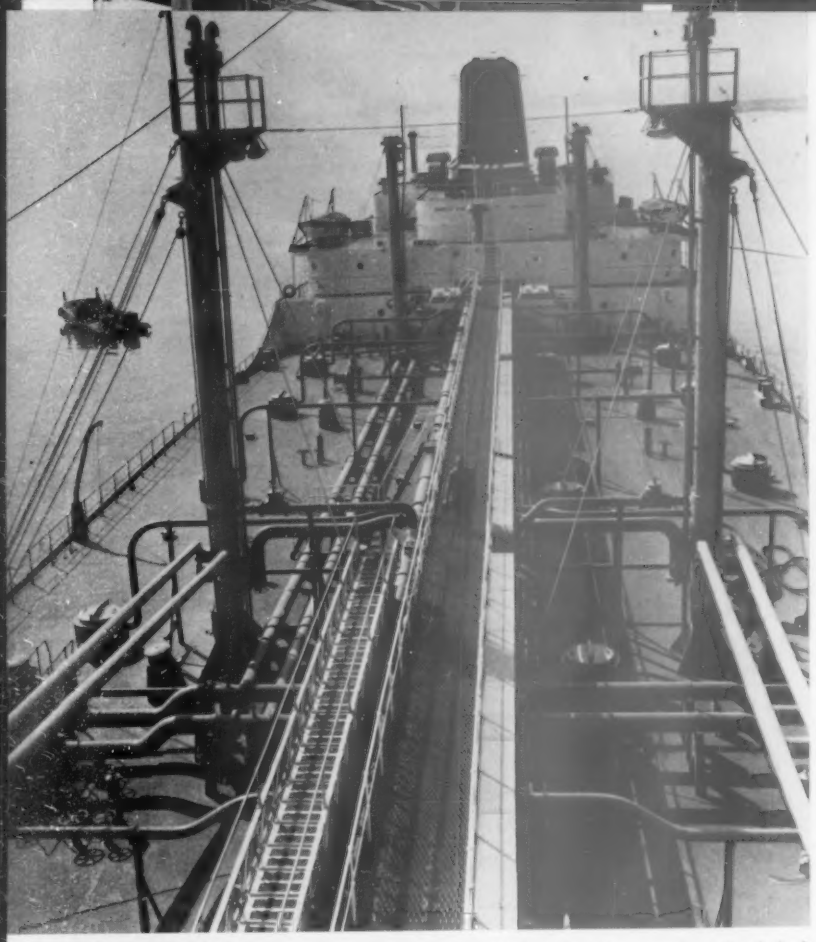

TEN CARGO TANKS run from port to starboard. Main header runs length of deck paralleling walkway. It carries CO_2 to each of the smaller pipelines which deliver it directly into the hatch of each compartment.

Giant Sun Oil tanker uses waste CO_2 to prevent fire

LIKE HER sister ships in the Sun Oil Co. fleet, the S.S. Eastern Sun is equipped with a CO_2 flue-gas fire-control system. This system has proved itself 100% effective in both Sun Oil refineries and tankships for more than 20 years.

One of 14 ocean-going tankships flying the Sun Oil colors, the Eastern Sun joined the fleet in 1955. Since then, she has logged well over 500 voyages without fiery mishap.

When hydrocarbon vapors are generated in unpurged or empty tanks or in tanks full of raw or refined combustible materials, enough air may leak in to make the tank atmosphere explosive. If 12% or more oxygen is present, it will combine with hydrocarbon vapors to form a combustible gas. The addition of carbon dioxide in quantities of 8% by volume will smother the oxygen and prevent any combustion.

Providing a ready source of CO_2 in refineries or other land-based installations is relatively simple, as is the setting up of a carbon dioxide fire-control system. But limited storage space aboard a ship and the expense involved in acquiring necessary quantities of carbon dioxide present problems in using this system on tankships.

A practical solution to the source of supply evolved from analysis of the waste flue gas discharged from a ship's smoke stack from boilers fired by fuel oil.

Solving Handling Problem

Harnessing inert flue gas for use as the neutralizing agent in this fire-control system gives rise to handling problems. Flue gas in the smoke stack has a temperature of about 330°. It also contains impurities.

To introduce this gas into cargo tanks requires cleaning and cooling it to prevent explosion and contamination. An effective pump and delivery system must be set up in order to feed enough CO_2 into the tanks at specific times. An accurate method of testing quality and quantity of gas and pressure along the line had to be developed; a reliable alarm system was required in the event of breakdown in any part of the routine.

Sun Oil Co. developed a six-step handling system to produce, prepare, and propel flue gas through a marine fire-control system. These steps are:

1. Generating—in main boilers.
2. Scrubbing—cleaning and cooling in a bubble-tower-type tank.
3. Pumping—by means of a rotary positive-displacement gas blower from supply through scrubber to deck distribution.
4. Distributing and venting—through pipe manifold system connecting engine room with cargo tanks.
5. Testing and recording—quality, quantity, and distribution of gas in cargo tanks, boilers, burners, etc.
6. Warning—alarm system indicating failures, pressures, or vacuums in units along the line.

How System Works

Boilers. The ship's main boilers furnish the source of supply of inert flue gas. The percentage of CO_2 in the smoke stack gases is regulated by controlling the volume of air delivered to the burners. The faster, the hotter the fuel burns, the more carbon dioxide is available to the system. From 12 to 13% CO_2 is most desirable in the stack gases.

To extract flue gas from the stack, 16-in. pipes are fitted in the uptakes, port and starboard, and connected to a common header to the scrubber inlet.

Scrubber. The scrubber consists of an elliptical shell tank in four horizontal sections. Flue gas enters the scrubber at boiler temperature and is cooled to about 90° F. It is also cleaned to remove impurities.

Each upper section of the scrubber is separated from the next lower section by channeled trays. Flue gas en-

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A Silent Servant of Safety, this equipment is installed at the fixed facilities and on refueler trucks and hydrant carts serving most of the world's major airports. It is approved and in production for the U. S. Air Force under recent contracts. For further information, write Aviation Products division, Warner Lewis Company.

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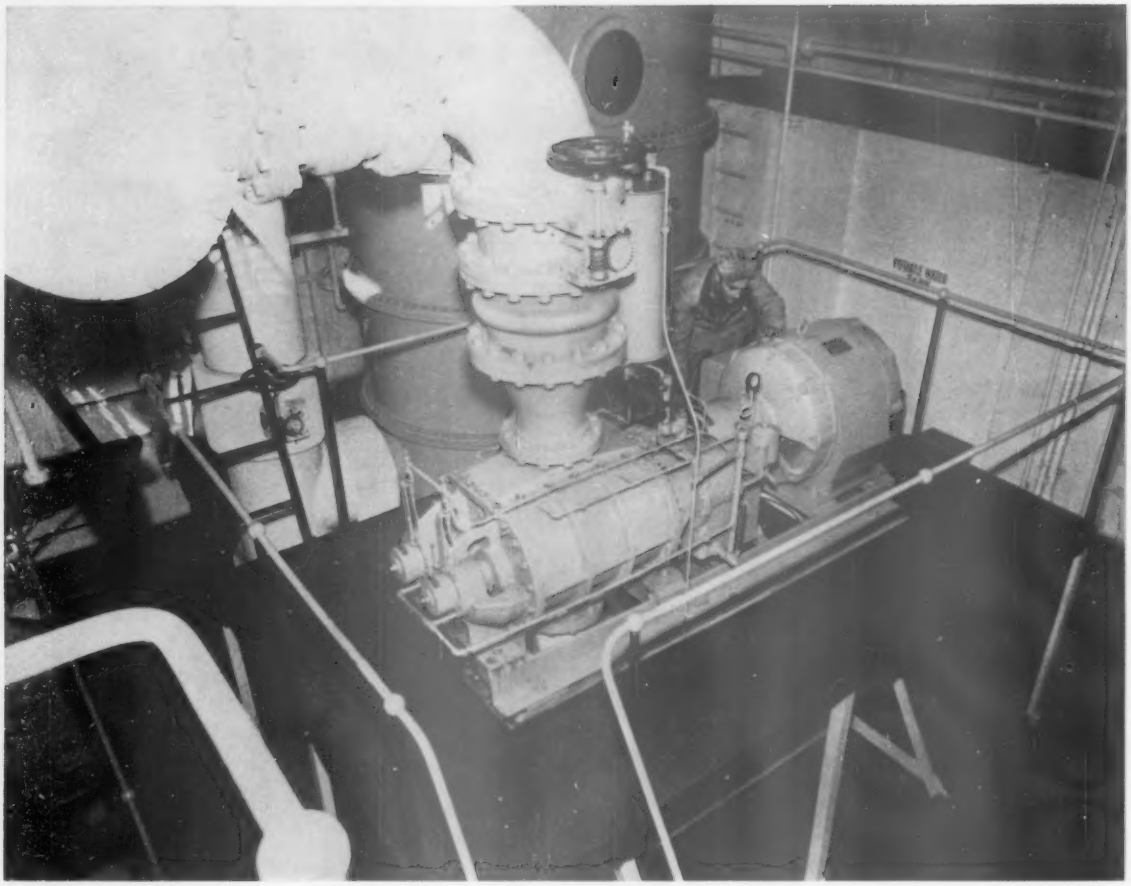


IN ENGINE ROOM, inert flue gas is drawn from ship's boilers and delivered through 16-in. pipe (left) to scrubber (center) where it is cleaned and cooled.

ters the bottom section through a serrated bell mouth submerged below the vessel's water level. It passes through a bath of 10 in. of water in the lower chamber and 2 in. of water in both the second and third chambers. A high and low weir on the trays insures that the channeled outlets are always immersed in water and that the gas passes through the water on its way to the blower suction at the top of the tank. The fourth section of the scrubber is a "dry" chember fitted with baffle plates to extract moisture from the CO_2 before it enters the rotary gas blower.

The system is protected against delivering hot gas to cargo tanks by an automatic valve in the inert flue-gas blower suction. This valve is opened by the pressure of the cooling water to the scrubber and closed automatically by any failure in the water system.

Pump. A 10 by 26.5 XB heavy-duty rotary positive gas pump manufactured by Sutorbilt Corp., of Compton, Calif., motivates the entire flue gas system. This unit has a 3,000-cu. ft. per minute capacity with a pressure of 2 psig. It is equipped with wide face, herringbone, spurs gears, double-thrust bearings, closed impellers, and renewable impeller tips. It also has force-feed lubrication.

This particular design of blower was selected for the job for its ability to handle gases containing a high degree of impurities and abrasive solids. Renewable impeller tips allow for replacement of worn tips resulting in restoration of much of the original efficiency without the expense of replacing entire impeller assemblies.

The gas pump is driven directly by an 800-r.p.m., four-speed electric motor.

Deck. Carbon dioxide is delivered to the deck through a main header running the length of the deck. It is fed from the main header into each of three cargo-tank compartments through smaller pipes running at right angles to the main header.

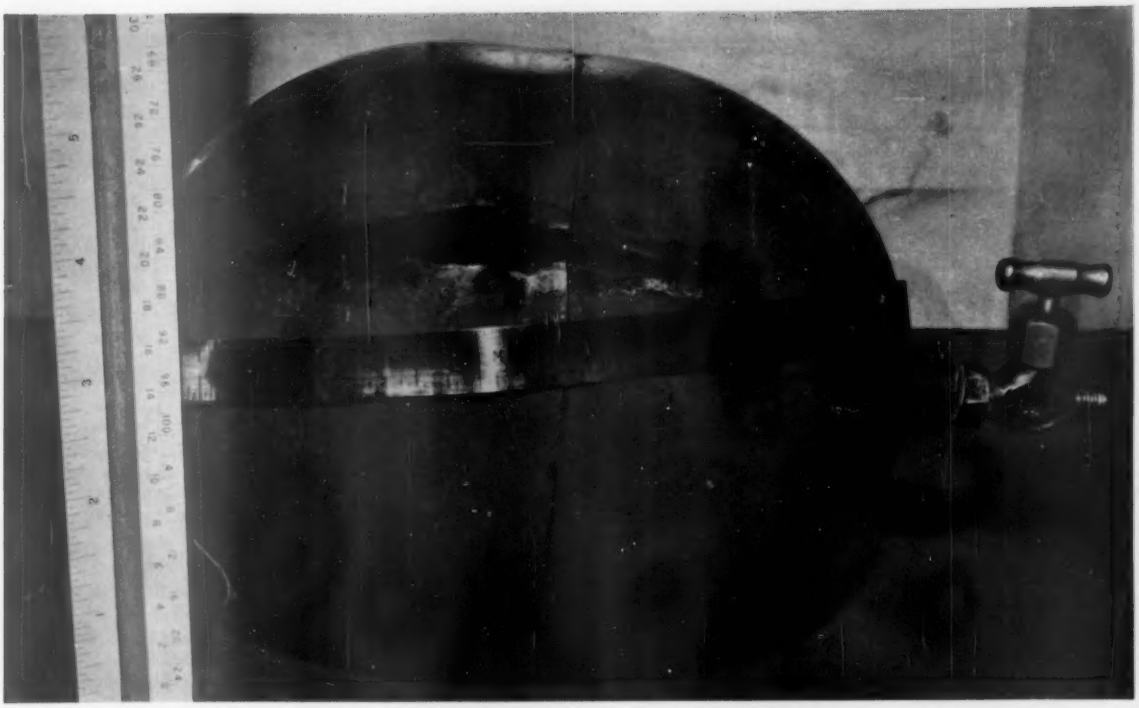
CO_2 is introduced into the main header through a gate valve. It passes through another gate valve and a check valve into the smaller pipes before entering the compartments.

The main header and smaller pipes are protected by pressure-vacuum valves.

Each of the small pipelines is connected to a flame arrestor, which acts like a miner's lamp, and a vent high above the deck on masts and kingposts. The Eastern Sun has six such vents.

Testing and recording. So important is the CO_2 system to the safety of the ship, its crew, and cargo that several testing devices are used in the engine room and on deck, to periodically check its effectiveness. The operation of the flue gas system is carefully recorded and logged as part of the ship's voyage report.

Alarm system. A series of automatic alarms indicates failure of the cooling apparatus in the scrubber, failure of fusible link in the blower suction, excess pressures or vacuums on the main header or each group of manifolds. Should any part of the flue gas system fail to function properly, the entire system shuts off automatically.



SAMPLE CONTAINER for field butane exploded when temperature increased. And the butane flashed. Fortunately no one was injured, but it was a graphic demonstration that it pays to know . . .

How to tame a sample bomb

BY J. C. DUCOMMUN
General Manager, Manufacturing
Standard Oil Co. (Ind.)
Chicago, Ill.

BOMBS FOR SAMPLING light hydrocarbon liquids can be as dangerous as their name implies. This was demonstrated recently at the Mandan, N. D., refinery of Standard Oil Co. (Ind.)

A bomb of 1,900-ml. capacity ruptured, releasing butane vapors, which flashed. Fortunately, no one was injured, but the potential was extremely serious.

The bomb involved was an Air Force surplus 1,900-ml.-capacity oxygen container, thought to be stainless steel, but later found to be low-carbon steel. Design pressure rating was 500 psi., and the working pressure rating was 400 psi.

The bomb was being used as a sample container for field butane. Before delivering the bomb to the alkylation unit, the laboratory had introduced into it a known amount (about 30 ml.) of dry ethylene glycol. An alkylation operator, experienced in sampling field butane, had filled the bomb with field butane at a line pressure of 220 psi. at a temperature of 26° F., for sampling of water content in the laboratory.

At the refinery laboratory, the bomb was placed in a shaker to assure that the ethylene glycol would mix thoroughly with the butane sample absorbing moisture from the butane. During the shaking, the bomb ruptured, releasing the contents which vaporized rapidly and flashed at a furnace in which carbon was being burned from a sample of cracking catalyst.

Three persons were in the laboratory when the butane flashed. The fire was extinguished within a minute with carbon dioxide extinguishers. Damage was minor, being confined primarily to a scorched ceiling, broken windows, and bulged fresh-air ducts.

The bomb ruptured along longitudinal planes, as would be expected if failure was caused simply by overpressure. No major divergency in the path of the fracture was apparent. Micrometer measurements showed that the wall thickness of the metal shell ranged between 0.031 in. and 0.040 in.

Rupture occurred through the thinnest portions of the hemispherical components. Although some local expansion of the metal shell was noted, the expansion did not appear to be attributable primarily to the variation in wall thickness.

Metallographic examination revealed that the bomb had failed in a ductile manner, by the shear mode of fracture. The base material consisted of low-carbon steel that appeared to be of normal quality. The two hemispherical components were joined with a copper-base brazing alloy. The brazed joint was sound.

Calculations based on butane as the contained liquid, indicated that up to the yield point of the low-carbon steel, the pressure on the metal shell would be increased about 38 psi. for each 1° F. rise in temperature. Also, it was estimated that the base metal would have started to yield at a pressure of about 550 psig. Once the base metal started to yield, sub-

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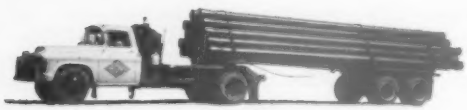

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sequent unit pressure increase per 1° F. rise in temperature would have been less than 38 psi.

The bomb had been filled with field butane at a temperature of about 26° F. and a line pressure of about 220 psig. Under these conditions the bomb could have been liquid full, any contained air having been dissolved in the butane. After being brought into the laboratory and upon warming to room temperature of 75° F. from 26° F., the liquid expanded.

It appears, therefore, that thermal expansion of the contained liquid, resulting from the 49° F. rise in temperature, could have subjected the bomb to a pressure of at least 1,000 psig., and possibly to even higher pressures if bursting had not occurred.

The operator who had taken the field butane sample had probably failed to vent the bomb after filling it. The regular sampling procedure requires venting to assure a vapor space in the container. Although the operator was aware of this and customarily vented similar samples, he admitted that he might have overlooked venting of this particular sample.

Butane samples are vented in the laboratory before being shaken prior to testing. This sample was one of a number which had arrived in a group and it may have been overlooked.

A committee appointed to make a complete study of the subject of sample bombs for high-pressure liquid hydrocarbons, is giving consideration to, among other things, the following:

1. Standardize on the use of 75 and 150-ml. bombs manufactured of monel. Pressure rating of these bombs would be 5,000 psi.
2. Visual inspection of bombs whenever valves are changed and pressure testing to 8,000 psi. every 5 years.
3. Require specific approval for larger bombs which are to meet these specifications, limiting the maximum size to 300 ml.
4. Tag each bomb, giving serial number, volume, tare weight, and date for next pressure test.
5. Permit only trained personnel to take samples of high-pressure liquid hydrocarbons.
6. Require sufficient outage for all samples taken.
7. Close the open end of each valve with cap or plug immediately after bomb has been filled and vented to prevent escape of gas if valve fails.
8. Provide carriers for transportation of bombs.
9. Check all bombs for leaks when brought to laboratory and place immediately in a freezer at 20° F. Discard sample if bomb leaks.

10. Check outage of each bomb by weighing before distributing for analysis.

11. Keep bombs in hoods while awaiting analysis or pick up for discard.

12. Provide daily pickup of bombs containing samples that have been analyzed.

13. Discard samples through a steam vent. Access to the vent shall be in a fume hood.

14. Bombs with inoperative valves should be marked and delivered to the sampling technician for removal of the valves. This work must be performed in a hood and extreme care used to guard against the possible sudden release of trapped hydrocarbons.

We intend to inform the industry of our conclusions when our studies have been completed. In the meantime, these contemplated precautions may be of value by stimulating a review of practices and equipment design.

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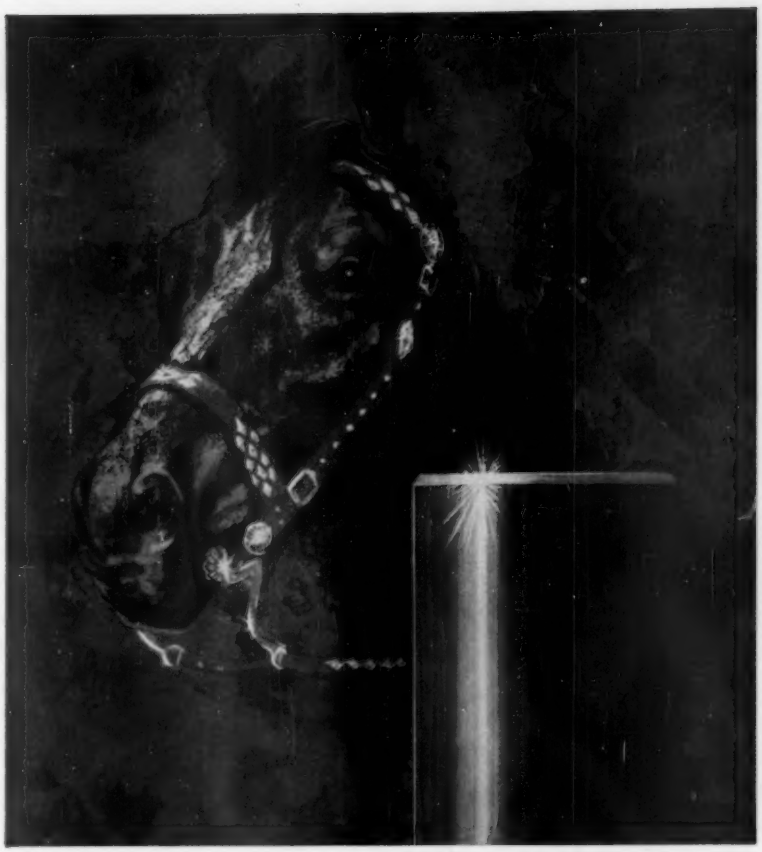
- Estimated compressor-station costs for current projects.

Watch for this important cost report in the June 27 issue of The Oil and Gas Journal.



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BY W. L. NELSON
Technical Editor and
Petroleum Consultant

What's the price of coke?

What is the price of coke? Do you have analyses? Is composition significant costwise? What companies calcine coke? Have books been written on coke? Is there a bibliography? W. J. K.

A bibliography of items which have appeared in The Oil and Gas Journal (mainly Questions on Technology) is shown below.

Petroleum coke is a low-value material and hence nothing of significance regarding prices appears in the literature. In fact, the prices have been so low that the feasibility of coking has usually depended on the value of the gas and cracking-plant charge stock produced during coking rather than the value of the coke. Every effort has been made to produce as little coke as possible. Of course, the price depends on the quality but it would be more accurate to say that the coke cannot be sold at all unless it meets the requirements of the purchaser. Analyses are shown in Reference 6 below and in Table 3-30, p. 74 of the fourth edition of Petroleum Refinery Engineering. This department knows of no books that pertain specifically to coke, coking, or its economics. Ordinarily, refiners produce so-called "green" coke, and much of such coke is sent to calcining plants for the production of graphic or calcined coke.

In summery, coking is practiced primarily for the production of cracking stock, and only under rare and fortunate conditions is the value of the coke itself of much significance.

All of the references have appeared in The Oil and Gas Journal on pages edited by W. L. Nelson:

References

1. March 9 1953, p. 125, "Sulfur Content of Petroleum Coke."
2. March 23, 1953, p. 359, "Feasibility of Coking."
3. May 9, 1955, p. 137, "Allowable Sulfur in Metallurgical Coke."
4. May 30, 1955, p. 104, "Petroleum Coke in Steel Manufacture."
5. Oct. 31, 1955, p. 129, "Price of Petroleum Coke Will be Competitive."
6. Nov. 28, 1955, p. 117, "Properties of Petroleum Coke."
7. Dec. 19, 1955, p. 99, "Yields of Coke by Various Processes."
8. Sept. 3, 1956, p. 129, "Gas Produced in Coking."
9. April 8, 1957, p. 127, "Character of Coker Gas Oils."
10. April 15, 1957, Costimating No. 28, "Cost of Coking Plants."
11. July 13, 1959, p. 117, Process Costimating No. 52, "Operating Costs—Coking."

How to compute flame temperatures

Are there formulas for estimating flame temperatures using conventional data?—K. O.

The theoretical flame temperature can be computed by making a heat balance, that is, balancing the heat generated by burning one unit of fuel against the sensible heat contained in the products from one unit of fuel. Stated another way, heat is available by combustion. The only thing accomplished by the heat (barring radiation) is to heat the product of combustion and any excess air that may go through the combustion zone. Actual flame temperatures are lower because of radiation but usually not much lower in very hot furnaces or in very large-scale operations. Finally, sensible heat contained in the fuel or air (i.e., preheat) is also available to heat the products and this is the practice in open-hearth steel furnaces.

Formulas could be devised but everyone simply resorts to heat balance computations, probably because of difficulties in accounting for radiation.

When burning hydrocarbon fuels, the magnitude of the flame temperature is governed almost entirely by three factors:

1. Heat of combustion of fuel. If it is high, the flame temperature tends to be high.

2. Amount of excess air. Excess air reduces the flame temperature.

3. Preheat of fuel and air. If the preheat is, say 300° F. above room temperature, the flame temperature is also increased about 300° F.

Thus little can be done about flame temperature except to alter items 2 and 3.

If exotic chemical fuels are involved, more variations in heat of combustion or heats of reaction are possible.

The theoretical flame temperatures for ordinary fuels can be read along the top (100% sensible heat) of Figs. 14-2 and 14-3 of the fourth edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., Inc., N. Y., 1958):

at 100% XS air . . . . 2,300° F.
50% XS air . . . . 2,900° F.
25% XS air . . . . 3,300° F. (est.)

These charts include no preheat of air or of fuel.

Urea dewaxing

Will you please direct us to manufacturers or patent holders by which we can study the urea dewaxing process mentioned on page 324 of your fourth edition of Petroleum Refinery Engineering? J. L.

The first patent application was that of Bengen (German, O. Z. 12438, March 18, 1940, issued 869070, January 22, 1953) [1,4], and the first commercial application was made by the L. L. Sonneborn refinery[2] (Petrolia, Pa.) in late 1950. The Sonneborn operation is covered by U. S. Pat. 2731455. A German plant (Deutsche Erdoel A. G., Heide, Germany) was started [3,5] in July 1955 and a large commercial installation was completed[4] by Standard Oil Co. (Indiana) Whiting, Ind., during 1957.

Although the process has the enormous advantage of requiring no refrigeration, it has its troubles with large equipment and many stages of filtration, washing, and distillation. For these reasons, it has thus far been applied primarily to special situations such as the removal of the last traces of wax, or the production of exceedingly low-pour-point oils.

References

1. Hepp et al., "Utilization of Kerosene Stocks for Jet Fuel . . .;" Ind. Eng. Chem., Jan. 1953, p. 112.
2. Anon., "Urea for Dewaxing;" Chem. Eng., May 18, 1959, p. 142.
3. Anon., "Urea-Adduct Process . . .;" Chem. Eng., Nov. 1956, p. 114.
4. Rogers et al., "Light-Low-Pour Lubes . . .;" OGJ, July 15, 1957, p. 107.
5. Hoppe and Franz, "Low-Pour Oils Made by Urea Process"; Pet. Refiner, May 1957, p. 221.

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Mechanical simulators used to check design formulas

BY JOSEPH ZABA

MOST FORMULAS in use are close approximations, but they give results that have withstood the test of time in many installations.

In the years following Emory N. Kemler's 1936 experiments with electrical analog, to simulate the sucker-rod pumping system, other investigators pursued this method of approach to the problem. In 1953 M. H. Halderson presented the practical possibilities of theoretical analog studies.[1]

Into a properly constructed simulator all known variables would be set, such as lengths of stroke, speed of pumping, different sizes of rods and pumps, and others. The unknown variables, such as rod friction, would be adjusted until the simulator would reproduce the field dynamometer cards. If this procedure were repeated many times the averages and the range of values of these unknowns could be determined.

The next step would be construction of curves, based on actual facts, for quick selection of pumping unit sizes for given depth and volume conditions and of other curves for determining the size of rods and pump, of power requirements, and of other variables for the specific unit selected for the specific well.

A catalog of a large number of dynamometer cards for different sets of operating conditions would be assembled to help in interpretation of the dynamometer cards taken in the field. Finally, the analog could be used for study of specific pumping problems which would merit special investigation.

Organization formed. In 1954, Sucker Rod Pumping Research, Inc., was organized to finance the building of a sucker-rod-system simulator and to study sucker-rod pumping problems by means of such a simulator. The technical advisory committee of the organization made a study of different possible approaches, the use of the electrical analog, the electronic analog computer, the mechanical simulator, and the digital computer. After considerable study, the mechanical simulator was decided upon and Midwest Research Institute, of Kansas City, Mo., was selected to build the simulator and to conduct the study.

Construction of the simulator was essentially complete in 1957. The prime mover is represented by a small direct current motor, the characteristics of which can be varied over a wide range.[2] The pumping unit and the pump are scaled-down models. Strings of rods and tubing and the fluid column are simulated each by an oscillatory rotating system consisting of flywheelers connected by torsional elastic elements. This approach is made possible by the fact that equations for such systems are of the same form as those for the pumping strings. Torque, angular displacement, moment of inertia, and torsional elasticity in rotative simulation of a reciprocating system are proportional, respectively, to force, linear displacement, mass, and linear elasticity.

As is usually the case with this type of a project many problems are being encountered in the course of studies which are still continuing. One of the problems is that of simulation of damping. Changes had to be made in the simulator as originally built. An electronic analog is now also being used.

Study of sucker-rod pumping assemblies by means of simulators should substantially increase our knowledge of the problem. It should prove particularly valuable in analysis and correcting the performance of the existing installations. The benefits as far as original selection of equipment is concerned, are not as apparent.

Formulas approximate, but good. Admittedly the formulas now used in the original selection of equipment of pumping installations are only an approximation. The fact remains, however, that tens of thousands of sucker-rod installations designed by use of these formulas, are operating with a minimum of difficulty. This suggests that, if there were an error in designing, the error was on the safe side.

The conservative approach to the original sizing of equipment is rather understandable. In selecting new equipment for a well to be pumped certain assumptions have to be made regarding the well's characteristics. The assumptions may or may not prove to be correct. Also, the factors affecting loading of the system may, and usually do, change during the useful life of the installation. Regardless of how rigorously formulas may be developed for calculation of loads, torques, and motions of the system, it is the judgment of the designer which decides what safety factors have to be assigned to the unknowns which are always present.

Assume that a new approach to original selection of equipment would justify the use of small and inexpensive equipment. It should be noted that the operating cost throughout the pumping life of the well is of equal, if not of more, importance than the cost of the initial investment. The operating cost may become quite substantial if the selected equipment proves to be too small for the changed conditions.

Method of approach. In presenting in these articles the methods and the formulas for calculation and analysis of beam-pumping installations it is planned to minimize the theoretical background in order that the practical aspect of the subject is not obscured. To do this, and because of the complexity of the problem, a special method of approach is needed.

A sucker-rod pumping installation consists essentially of seven components: the prime mover, the power-transmission unit, the pumping unit, the rod, tubing, and fluid columns and the subsurface pump. Because of the already mentioned interdependence of action of these components the calculations leading toward the initial design of the installation must consider the whole system as a unit. While this procedure is necessary in design calculations when the needed

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A uniform case depth and hardness is maintained, eliminating soft spots. Axelson helped steel companies develop non-destructive ferro testing to avoid split tubes. Quality is upheld through concentricity, straightness, finish and closely maintained tolerances.

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Field Tested—A highly abrasive and corrosive California well in the Bakersfield oil field had consistently chewed up ordinary plungers (such as one shown at right) in a matter of several weeks. Axite plungers were finally installed. The Axite plunger shown at left ran 25% longer than the best previous plunger.

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formulas are understood and agreed upon, it could not be used in a series of articles, the purpose of which is to discuss the behavior of a sucker-rod system.

On the other hand an attempt to arrange a logical sequence of discussion of the components of the pumping mechanism would be difficult because of the effect of the action of each of them on the other. For instance, if the pump were selected as a starting point of such a discussion, continuous references would have to be made to the behavior of the rods to explain the action of the pump.

The only proper approach, therefore, appears to be one in which a general concept of the system is considered first. In such a discussion all the mechanical details of the assembly will be disregarded and only the motions, forces, loads and torques involved will be considered. Such a general discussion would create a background for better understanding of later analysis of the components of the system when these considerations would be enlarged upon and the mechanical details of the equipment would be included. Such approach must, of necessity, deal with certain fundamentals, which may appear to be rather obvious. However, it has the advantage of maintaining the continuity of thought and eliminating the possibility of confusion.

Even in this preliminary discussion, however, some consideration will have to be given to the effect on the behavior of the system of the geometry of the pumping unit. A pumping unit is essentially a system of levers and of connecting arms. Of importance are the relative positions of the pivotal points of these levers and arms and their relative lengths. They all have effect on the motions, on manner of applications of forces, and on magnitude of loads and torques.

Of importance also is the direction of rotation of the unit for certain geometrical layouts of the units. Details of these considerations are within the province of the manufatcurer who designs and builds the pumping units. However, general understanding of the subject is of importance to the user of the equipment who wants to be assured of a most efficient installation.

References

1. M. H. Halderson, "Artificial Brain is Required to Solve the Sucker-Rod Pumping Problem": Drilling and Production Practice, API 1953, p. 210.
2. M. H. Halderson, "Mechanical Simulator that Duplicates Behavior of Sucker-Rod Pumping Systems." A paper presented before the annual meeting of the American Institute of Mining, Metallurgical and Petroleum Engineers, Los Angeles, October

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Safety has been built into the hoist. It will not ratchet under load if handle is released nor will it free chain. Controls are protected from inadvertant shifting. The bottom stop eliminates any hazard from the handle being released unintentionally and prevents handle from being moved to a position parallel to the load chain which would develop undesirable twisting action. The exclusive safety handle bends to indicated overload.

Strength without excess weight in the new hoist is achieved by a special aluminum alloy which is used in the body and handle. Long service life has been provided by the high tensile material in the chain retaining guide, heat treated load sheave and the plated, high tensile, heat treated alloy steel link chain. Maintenance is held to a minimum by the rugged construction and simplicity of design.

The new Coffing RA Series Safety Pull Aluminum Ratchet and Pawl Lever Hoist is available in six models with capacities from ¾ to 6 tons. Write for Bulletin ADH-86.

COFFING HOISTS

DUFF-NORTON COMPANY

COFFING HOIST DIVISION • Pittsburgh, Pa.

COFFING HOISTS
Ratchet Lever • Air
Hand Chain • Electric

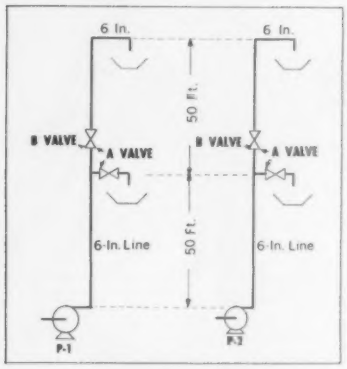
DUFF-NORTON

DUFF-NORTON JACKS
Ratchet • Screw
Hydraulic • Worm Gear

The
FOREMAN'S PAGE

Here is the last of 10

Fluid-flow questions and answers



QUESTION 6

Pump P-1 is a big pump which will pump 1,000 g.p.m. at 25 psig. (it develops 30 psig. with the discharge valve shut). Pump P-2 is a much smaller pump which will pump 10 g.p.m. at 100 psig. discharge pressure (it develops 125 psig. with discharge valve shut). Both pumps are full of water and the suction tied into a fresh-water tank with both pumps running. (Each foot of water = .433 psi. of static pressure).

QUESTION 6a: If both A valves only (50 ft. above pumps) are opened, which pump will pump the most volume of water?

ANSWER 6a: Each pump will have to develop enough pressure to overcome the static head.

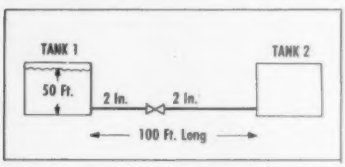
Static pressure = 50 ft. × 0.433 psi./ft. = 21.65 psi.

Pump P-1 can develop 25 psig. at 1,000 g.p.m. Pump P-2 can develop a higher pressure but 25 psi. is all that is needed. Therefore P-1 will pump the most water.

QUESTION 6b: If both B valves only are opened, which pump will pump the most volume of water?

ANSWER 6b: Static head = 100 ft. × 0.433 psi./ft. = 43.3 psi.

P-1 will not develop enough pressure to overcome the static head. Therefore, no water will be delivered by P-1, and P-2 will pump the most volume of water.



QUESTIONS 7 and 8

Part of the water in Tank 1 is to be gravitated into Tank 2. Tank 1 starts out with 50 ft. of water in it and Tank 2 is empty.

QUESTION 7: When the valve is opened wide, how fast will water run out of Tank 1 into Tank 2 during the first minute? Use the table and neglect the effect of fittings.

G.p.m.	Δ P/100 ft. in 2-in. line (psig.)
20	0.7
40	2.4
60	5.2
80	8.8
100	13.2
120	18.5
140	24.6
160	31.5
180	39.2
200	47.6

Each foot of water will build up .433 psig. 2.3 ft. = 1 psig.

ANSWER 7: Static head = 50 ft. × 0.433 psi./ft. = 21.65 psi.

As flow begins from Tank 1 to Tank 2, the pressure at the bottom of Tank 2 is atmospheric or 0 psig. Therefore the pressure drop across the line will be 21.65 psig.

Chart shows the flow rate will be 130 g.p.m.

QUESTION 8: After awhile the level in Tank 1 is 30 ft. and Tank 2 is 20 ft. How fast (g.p.m.) is the water now moving between Tank 1 and Tank 2? Use table in Question 7, and neglect effect of fittings.

ANSWER 8: Pressure at bottom of Tank 1 = 30 × 0.433 = 12.99 psi.

Pressure at bottom of Tank 2 = 20 × 0.433 = 8.66 psi.

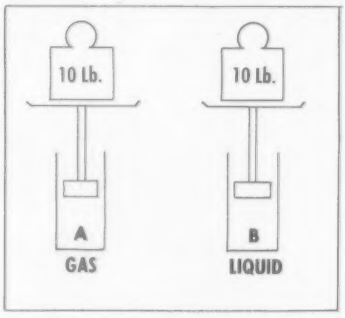
Pressure drop available to drive liquid = 12.99 − 8.66 = 4.33 psi.

Chart shows the flow rate will be about 50 g.p.m.

There are two cylinders as shown. Cylinder A is half-full of gas at atmospheric pressure and cylinder B is half-full of liquid at atmospheric pressure. The pistons in both cylinders are loaded with weights of the same size.

ERRATA

In the section on fluid flow, Part 8 (OGJ, June 6, p. 128) two of the figures were inadvertently reversed. Situation 5a should be 5b; situation 5b should be 5a. And the last paragraph on that page was extraneous.



QUESTION 9

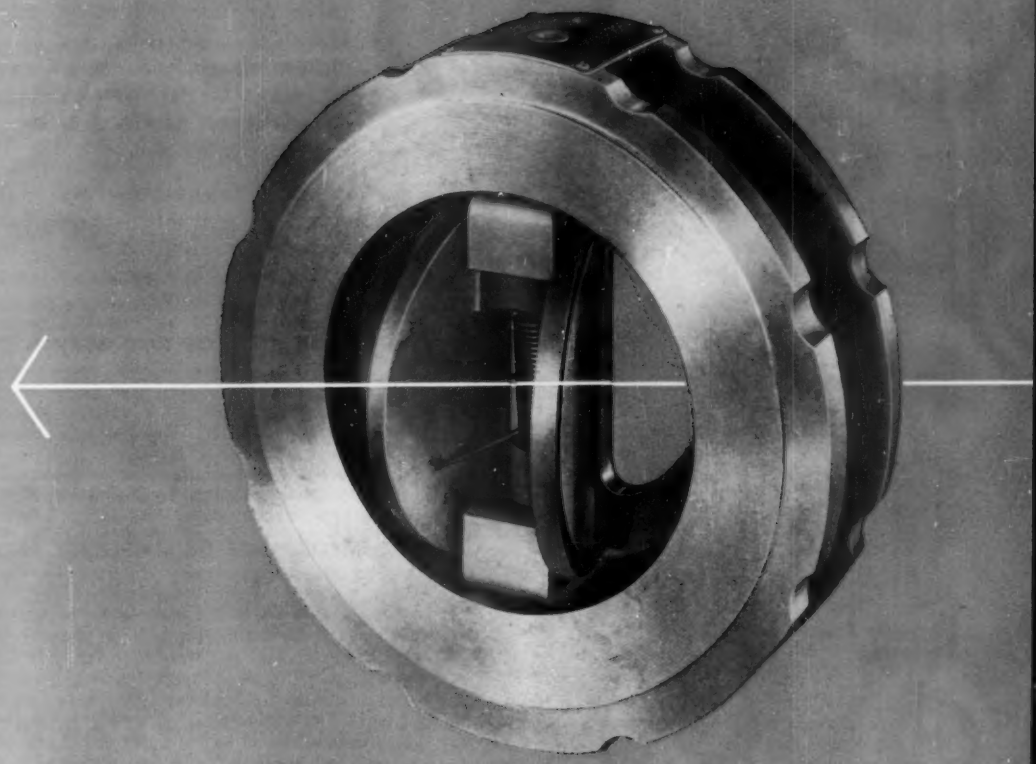
QUESTION 9: Assuming a good seal between the pistons and cylinders, what will happen to piston A and piston B when weighted down.

(a) Gas piston A will go down and B will stand still.
(b) Both A and B will go down.
(c) B will go down and A will stand still.

ANSWER 9: Gas piston A will go down and B will stand still. Liquids are incompressible (a).

fits between the flanges

less space—weighs only 10% as much



Mission Duo-Chek valves

Mission Duo-Chek Valves weigh approximately 10 per cent as much as conventional check valves. Smaller, lighter Duo-Chek Valves mean that you save on space, weight, installation, and price. But, you are getting a check valve with a bubble-tight seal, anti-slam closure, long life built in. No load is carried on the plate hinges. No external parts. No lubrication required.

The sine wave seal prevents seepage, yet holds without leaking or distortion at maximum test pressure. The sealing material is molded and bonded into a metal groove, making an "O"-ring type seal. Pressure deforms the packing. Metal-to-metal contact completely encloses the sealing material, preventing pinching off under pressure. Available in steel, 316 stainless, aluminum, and bronze to fit ASA raised face or ring joint flanges.

MISSION VALVE AND PUMP CO. A SUBSIDIARY OF MISSION MANUFACTURING CO.
P. O. BOX 4200, HOUSTON, TEXAS CABLE ADDRESS "MISSCO" • EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK
In the United Kingdom: MISSION MANUFACTURING CO., LTD., 1 Hanover Square, London W. 1 England • cable address "MISSOMAN"
Sold by Mission Manufacturing Company outside of Canada and the U.S.A.

MISSION VALVE AND PUMP CO.

Baker's New Snap-Set Duals

-the packers that are bringing single-zone control and simplicity to dual completions

Many operators are coming to feel that the best dual-zone hookup is a modern dual-string hookup. A Baker dual-string completion approaches the control and simplicity (and the flexibility) of a single-zone completion. It is the nearest possible equivalent to two single-zone completions in one well.

What makes this possible? Mainly the development of better upper retrievable packers—Baker's new snap-set duals. They are practical and reliable—and so are the Baker hookups they're used in. Operators all across the country are commenting on their impressive performance.

THE IMPORTANCE OF TWO TUBING STRINGS

Producing through tubing—whether from one zone or two—has its virtues. It protects the casing from corrosion and pressure damage. It encourages easier flow and longer flow, discourages gas separation and loss of natural lift. It makes it easier to run instruments and work-over tools, makes artificial lift easier.

It is clear that dual-string production can make the economic success of many wells—provided the hookups are practical. That's where Baker's new dual packers come in.

THE IMPORTANCE OF SIMPLICITY AND FLEXIBILITY

A good dual-string hookup is a simple one. Complexity never had a virtue, never had a payout—especially in a dual completion.

Simplicity is important because the hookup must be reliable and flexible. The key to these things is the upper retrievable packer. That is why Baker has explored every opportunity to simplify the design (see opposite page) of these rugged new dual packers.

A good dual-string hookup is a system—not a random assemblage of parts. This system must satisfy certain requirements. Many of the requirements depend on the upper retrievable packer.

First, both upper and lower packer must pack off and stay packed off. Nothing defeats the economics of a dual completion so readily as a packer that leaks.

Other requirements are equally important. Is it easy to set and unset the upper packer? Is spacing out simple? Can packers be tested before displacement? Can mud be displaced and zones washed while flanged up? Is there provision for simplicity of workover? For artificial lift?

It's all a matter of costs and returns. Baker dual packers were conceived to make dual string completions a paying proposition—and that is what they are doing. With these new packers, dual-zone production has come of age.

RELIABILITY IS BAKER'S STRONG SUIT

Any man who knows the Baker reputation will realize there's a lot of packer and squeeze tool experience behind these new retrievable packers. In fact, Baker's knowledge of these things is unprecedented.

Baker packers have proved themselves in thousands of wells the world over, holding for years, in many cases, against high pressures and withering temperatures. That's a tough proving ground for packing, slips, setting methods, and the like. That is one reason Baker packers are tough and reliable. Reliability is Baker's strong suit.

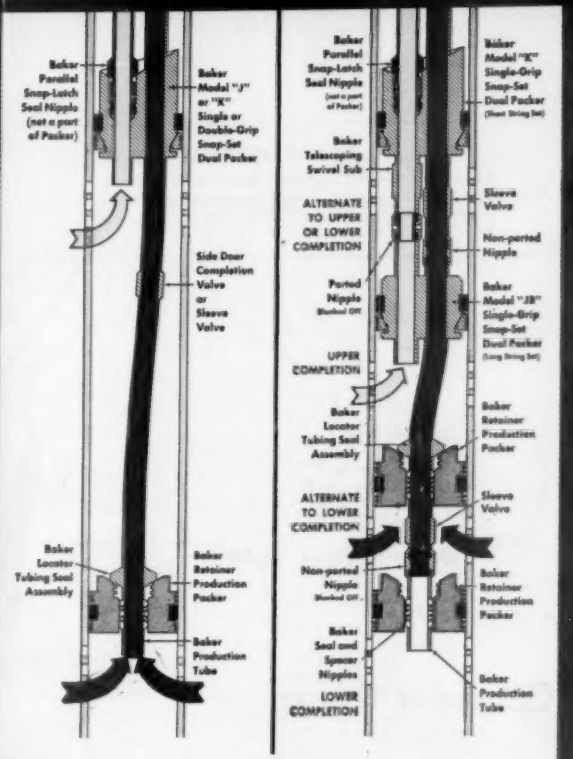
BAKER RETRIEVABLE SNAP-SET DUAL PACKERS

THERE ARE TWO BASIC MODELS. Each comes in a single-grip and a double-grip version. (Double-grip version has hydraulic hold-down buttons that tighten grip on casing when pressure from below increases.)

PICTURED IS MODEL J (Product 756-J) in the single-grip version. Model J is long-string set. You set it by setting down long string against the resistance of the stinger installed in lower retainer packer.

MODEL K ISN'T SHOWN. Model K (Product 756-K) is short-string set. You set it by setting down short string against resistance of long string. This permits either (a) keeping long string in natural tension, or (b) running another retrievable packer below the Model K.

A close look at Baker Dual-String Hookups – and at the Baker packers and accessories that make these hookups simple, flexible, and practical


Baker Parallel Snap-Latch Seal Nipple (not a part of Packer)
Baker Model "J" or "K" Single or Double-Grip Snap-Set Dual Packer
Side Door Completion Valve or Sleeve Valve
Baker Locator Tubing Seal Assembly
Baker Retainer Production Packer
Baker Production Tube
Baker Parallel Snap-Latch Seal Nipple (not a part of Packer)
Baker Telescoping Swivel Sub
ALTERNATE TO UPPER OR LOWER COMPLETION
Ported Nipple Blanked Off
UPPER COMPLETION
Baker Locator Tubing Seal Assembly
ALTERNATE TO LOWER COMPLETION
Non-ported Nipple Blanked Off
Baker Seal and Spacer Nipples
LOWER COMPLETION
Baker Model "K" Single-Grip Snap-Set Dual Packer (Short String Set)
Sleeve Valve
Non-ported Nipple
Baker Model "JB" Single-Grip Snap-Set Dual Packer (Long String Set)
Baker Retainer Production Packer
Sleeve Valve
Baker Retainer Production Packer
Baker Production Tube

LEFT, STANDARD DUAL STRING HOOKUP. It is simple and basic.

RIGHT, LOW COST MARGINALS. This hookup lets you pick up two marginal zones for little more than cost of two extra packers. Marginals can be produced as alternates to primary zones when allowables are reached.

TWO SIMPLE PACKERS. Basic to a good dual-string hookup are two types of packers. At bottom, to provide the vital separation of zones, a Baker Retainer Production Packer – the most respected retainer packer in use today. At top, to provide the flexibility that makes dual completions practical, a Baker snap-set dual – the new retrievable packer that is proving itself to the most demanding of operators.

UPPER DUAL PACKER: IT'S EASY TO SET AND RELEASE. When you set a Baker Snap-Set Dual Packer there's no ball dropping, no rotation, no pressuring. You set it by setting down minimum weight. To unset, you pick up. It's just that simple. (One model is long-string set, the other is short-string set. See opposite page.)

WHAT SNAP SETTING DOES FOR YOU. It's the snap-setting feature that lets you set and unset the Baker dual packer any number of times – for spacing out, testing packers, displacement, etc. There's nothing final in the latch action – no shear pins, for instance, to burn your bridges and make setting an action from which there's no turning back.

HOW CAN YOU BE SURE SHORT STRING IS IN PACKER? Baker makes a special snap-latch seal nipple that seals off the retrievable short string in sealing bore of upper dual packer. This nipple snaps into packer and holds firm. So to make sure it's seated, just stab in and pull back slightly.

YOU CAN COMPLETE FLANGED UP. Using a side door completion valve, or sleeve valve, or other method, you can displace mud and wash in both zones with well head flanged up. You keep the well under complete control.

WHY BAKER DUAL PACKERS HAVE LARGE BORES. Big bores through upper packer offer a real advantage. Packer bores should be as big as the tubing bores so instruments and workover tools won't hang up. In Baker dual packers the bores are that big – there's no restriction, no necking down. How large are the bores? A dual packer for 7″ casing is full-opening for two strings of 2⅜″ tubing. What makes this possible is simplicity of design. There are no elaborate seals, valves, or other mechanisms to restrict the packer bores.

HOW SQUEEZE TOOL EXPERIENCE CONTRIBUTED TO THE DESIGN OF SUPERIOR PACKING ELEMENTS. Baker dual packers have three packing elements. They're short and rugged – and the upper and lower elements are harder than the center element. It's a design similar to that used in Baker's high performance retrievable squeeze tool – the Full-Bore Cementer, which has been used in thousands of high pressure cementing, frac, and testing operations. The design accomplishes three things: It offers (a) positive pack-off with (b) minimum set-down weight, and (c) permits the packer to be repositioned or retrieved easily, because it prevents packing element extrusion without resorting to the metallic back-up rings that sometimes defeat retrievability.

WHAT THE PICTURES CAN'T SHOW. The pictures can't show the stored energy in the tubing string and what it does to maintain packoff. Some dual retrievable packers depend on trapped pressure for a static packoff. In Baker's opinion that isn't adequate, and may easily lead to leakage. It fails to compensate for any packing element extrusion that occurs – and there is usually some. The Baker method does compensate. In a Baker dual packer the stored energy in the tubing string (energy due to set-down weight) acts like a spring to keep the packing elements under a dynamic compression.

SLIP DESIGN PROTECTS CASING. The design of the slips and cones in Baker dual packers protects both casing and packer against excessive radial forces. (This also contributes to easy retrievability.)

IT IS READY TO RUN IN. When a Baker dual packer comes to the well, it's ready to run in. Slips, hold-down buttons, inside seals – they've all been tested and checked out at the factory. Their readiness is known.

SOMETHING TO KEEP IN MIND. Parts are always available, and so is service. Baker operates one of the great domestic oil-field service organizations.

SPECIAL FACTS ON PLANNING DUAL STRINGS
The variables of a dual-string hookup can be many. Baker field staffs are especially well prepared to discuss these things. They have all the latest facts and figures on Baker's intensive continuing study of dual completions. Please contact your Baker branch office for information.

BAKER
SNAP-SET DUAL PACKERS

BAKER OIL TOOLS, INC. | HOUSTON | LOS ANGELES | NEW YORK

BY E. A. HARTSOOK
Production Economist
Standard Oil of California

- Price
- Payout
- Interest rate

Consider these carefully in reserve evaluation

It should be clear that economic considerations are of tremendous significance in valuation calculations. Casual approaches to the factors of price, payout, and interest rate can be just as disastrous, if not more so, than casual approaches to the technical evaluation of future production potential.

ONE of the most common, basic problems being dealt with day in and day out by the oil industry is the question of reserve valuation. In many ways, this is a "backbone" calculation—most important in its effect on the very raw material that will later be transported, processed, and marketed.

On one hand, it influences the exploration decision. Should we spend exploratory effort in this or that area—or not at all? The answer to a considerable degree depends on the valuation of the contributing geological work in terms of the potential profit that may be realized.

On another hand, it influences the decision on how to operate. How many wells should be drilled? How about secondary recovery? What about production levels? Answers depend on the valuation of alternative courses of action and the projection of the effects of these decisions into the future.

Note: Part 2 of this article on the economics of reserve valuation will appear in an early issue.

Then, of course, there is the whole area of sale and purchase of oil reserves and the myriad financial activities that surround these operations. No property is bought or sold—no property investment is made—without detailed evaluation of its projected financial effect.

A vital problem. So the oil-reserve valuation is important. Large, highly trained staffs of people are devoted to this one problem in oil companies, in investment and banking organizations, in consulting groups. Much money and a great deal of effort goes into making these valuations correct.

Why belabor this? Simply to call attention to the fundamental importance of valuations and to point out that in many, if not most, cases important elements of the calculation receive only cursory analysis.

The engineering, geology, geophysics, etc. work is normally conducted in great detail. In valuation problems of any size, these studies may involve many man-days of intensive work. But then, several questions of a purely economic nature are plugged in with very little study at all. These include interest rates, future price and market allowables, tax, and cost changes in the future.

Any one of these factors can have as great an influence on the final answer as the engineering determinations. And, quite often, price and market considerations can be dominant in the entire problem.

Illustrative Valuation Procedure

To point this out specifically, let us review typical valuation procedure briefly.

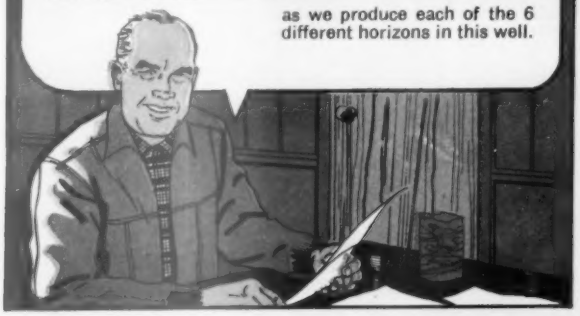
The valuation calculation is simply a method of combining predicted future production from a given pool with cost, taxes, product realizations, and estimated market restrictions to yield an estimated future net income by years. After these computations are made, the annual net values are discounted at an assumed interest rate to bring them to a common initial point in time so that the value of the investment may be compared readily with alternative opportunities.

To illustrate this numerically, a particular (but simplied) valuation is use-

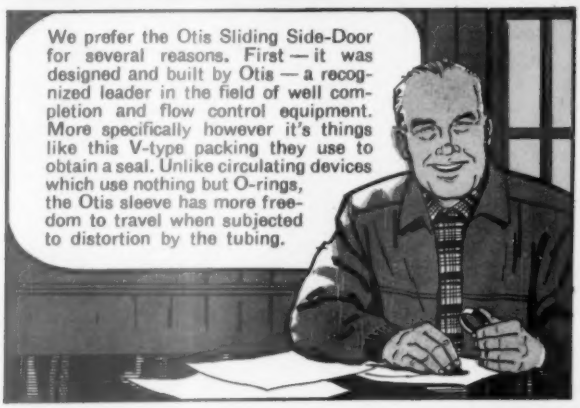
OTIS SLIDING SIDE-DOOR EQUIPMENT

WILL SAVE US SEVERAL HUNDRED DOLLARS PER ZONE

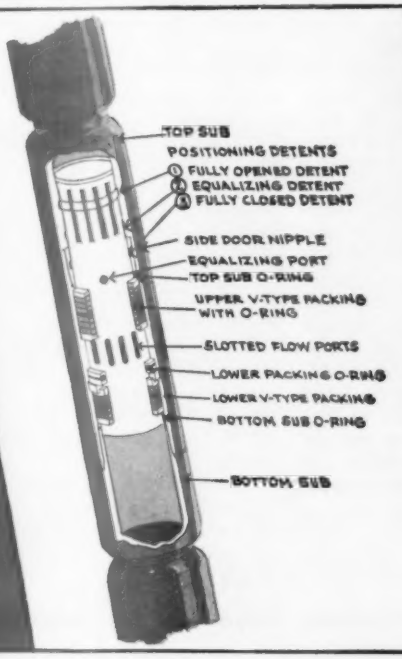
as we produce each of the 6 different horizons in this well.



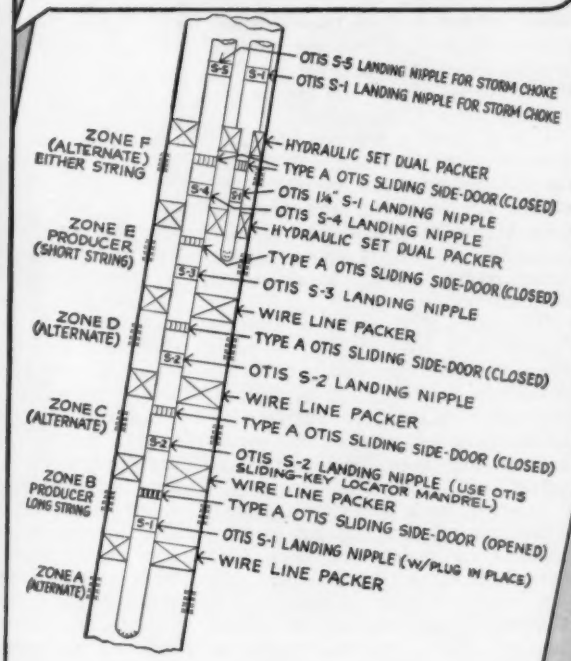
We prefer the Otis Sliding Side-Door for several reasons. First — it was designed and built by Otis — a recognized leader in the field of well completion and flow control equipment. More specifically however it's things like this V-type packing they use to obtain a seal. Unlike circulating devices which use nothing but O-rings, the Otis sleeve has more freedom to travel when subjected to distortion by the tubing.



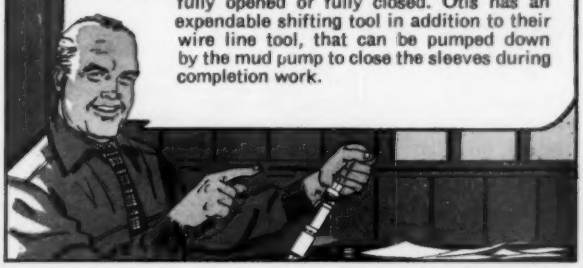
Then there's Otis' vertical slotted port design. This gives Otis Sliding Side-Doors maximum strength — and acts to prevent distortion of the tools as they are subjected to the stress and torque of a production string. Models with special pump-out plugs are also available to let you test your packer before nippling up the tree. Check the design advantages in this drawing.



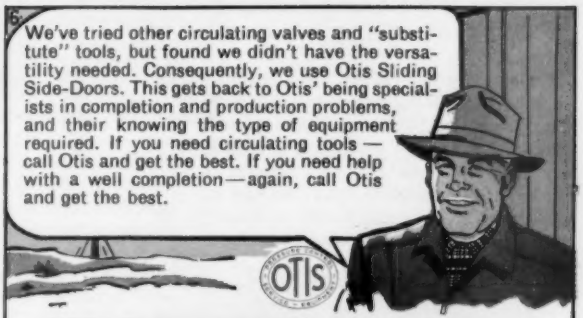
2 Add to that the thousands of dollars we saved by drilling only one well to produce these 6 formations and you'll see why we're sold on multiple-zone wells and Sliding Side-Door® equipment. Here's a diagram of the well.


OTIS S-5 LANDING NIPPLE FOR STORM CHOKE
OTIS S-1 LANDING NIPPLE FOR STORM CHOKE
ZONE F (ALTERNATE) EITHER STRING
HYDRAULIC SET DUAL PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
OTIS 1¼" S-1 LANDING NIPPLE
ZONE E PRODUCER (SHORT STRING)
OTIS S-4 LANDING NIPPLE
HYDRAULIC SET DUAL PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
OTIS S-3 LANDING NIPPLE
ZONE D (ALTERNATE)
WIRE LINE PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
OTIS S-2 LANDING NIPPLE
ZONE C (ALTERNATE)
WIRE LINE PACKER
TYPE A OTIS SLIDING SIDE-DOOR (CLOSED)
OTIS S-2 LANDING NIPPLE (USE OTIS SLIDING-KEY LOCATOR MANDREL)
ZONE B PRODUCER LONG STRING
WIRE LINE PACKER
TYPE A OTIS SLIDING SIDE-DOOR (OPENED)
OTIS S-1 LANDING NIPPLE (W/PLUG IN PLACE)
ZONE A (ALTERNATE)
WIRE LINE PACKER

Another advantage of this Otis equipment is that with their shifting tool they can open and/or close one or several sleeves with just one trip of the wire line. And you're sure the sleeves are fully shifted, too. Otis' shifting tools won't release until the sleeves are either fully opened or fully closed. Otis has an expendable shifting tool in addition to their wire line tool, that can be pumped down by the mud pump to close the sleeves during completion work.



6 We've tried other circulating valves and "substitute" tools, but found we didn't have the versatility needed. Consequently, we use Otis Sliding Side-Doors. This gets back to Otis' being specialists in completion and production problems, and their knowing the type of equipment required. If you need circulating tools — call Otis and get the best. If you need help with a well completion—again, call Otis and get the best.



OTIS ENGINEERING CORPORATION

General Offices: 6612 Denton Drive • Dallas

Branches Throughout the Oil Country

ful. Fig. 1 shows graphically the assumed production and gross value by years of 20 years of production of oil only from pool ALPHA.

Now, if we assume that drilling is already completed and facilities installed at the start of the valuation period, Table 1 shows the annual breakdown of gross and net income. It also shows clearly the use of the interest discount calculation.

If a prospective investor wishes to make a return of at least 5% (before tax considerations) on his money, he cannot pay more for this property than $1,700,000. If he can acquire it for less, he will of course earn a better return but he cannot exceed this amount.

This number also can be used to indicate to a seller what return he is giving up or to provide a basis for evaluation of the amount of exploratory effort that can be put into acquiring a similar property after giving consideration to the risk factors involved.

In some cases, a less sophisticated, shorter calculation can be used to indicate the number of years until the investment involved has been paid out. This is merely an indication to both buyer and seller of the relative attractiveness of this and other investments. It is much less definitive than the rate of return calculation and can lead to serious investment error, as we shall see later.

Variations in Price

With this sample valuation as a working tool, let us investigate the result of variation of individual economic assumptions.

First is the question of future price. Going back to the turn of the century, we find a secular trend in oil prices that has been upward about 3% annually. There have, of course, been major fluctuations in this trend. Since World War II, the trend has been more abrupt—averaging about 5% to the present and above 6% if one looks at the postwar period up to the recent period of market difficulties.

These trends reflect both supply-demand and inflationary factors. And, looking toward future demand growth and rising cost of necessary domestic supply to maintain this country's energy independence from the rest of the world, it is reasonable to believe these upward pressures will continue.

If price goes up. In Fig. 1 and Table 1, gross value was based on a constant price assumption of $3 per barrel. Now let us assume instead that price will increase at a rate of 6% per year compounded and that operating costs will continue through this period to represent about 10% of gross value (also reflecting inflationary effect). Instead of a value of $1,715,000 to yield a 5% return on investment, an investment of $2,290,000 will now yield 5% even after considering purely inflationary factors. Thus, the investor who may have refused this opportunity at a figure somewhat higher than the first value may find he seriously undervalued his potential income and refused a profitable investment. The magnitude of error in this case was about one-third. With less-abrupt production decline it would be greater.

Naturally, there are many variations on this theme, but the error is real and the lost opportunity for investment (or too-cheap sale by a seller) can never be regained.

Is this academic? Look at the period since 1945. There are few companies or firms who did not fall into this exact situation and awake to missed profits.

On the other side of this price coin, prices can also decline for significant periods of time and this, coupled with possible reductions in allowable production under state regulatory procedures, can seriously reduce the predicted rate of return and markedly overvalue the investment. In the last 2 or 3 years, there are many companies and individuals, together with their advisors (particularly in the Southwest), who will testify to the reality of this problem.

Later in these discussions we will look at some of the techniques that may be used to deal with this issue but, for the moment, priec and market-allocation factors should be listed as most important elements of the valuation problem, requiring just as much thought as technical reserve and production analysis. Ultimate answers will not be precise, but neither are estimates of recovery factors, reservoir, behavior, and the like. One point is certain, they **will** materially affect answers and decisions; no valuation should be considered complete without their thorough investigation.

TABLE 1—GROSS, NET, AND DISCOUNTED INCOME-POOL "ALPHA"

Year	Average annual production (1,000 bbls.)	Average annual gross income ($1,000)	Average estimated net income before tax ($1,000)	Discounted net income at 5% ($1,000)
1	100	300	270	260
2	90	270	243	220
3	81	243	219	190
4	73	219	197	160
5	67	201	181	140
5-10	45	135	121	425
10-15	28	84	76	210
15-20	18	54	49	110
				1,715

Variations in Interest Rate

In this same vein, we may also turn to the role of interest rates and their effect on valuation results. The importance of the concept itself lies in its ability to serve as a definitive yardstick of investment appraisal. It does provide specific comparison of alternates—exact mathematical answers. But interest rates, like prices and the factors of market regulation, must be carefully used if the final answer is to be of real value.

Perhaps the first question that should be squarely faced is: Should the interest calculation be made at all for the specific problem in question? To illustrate the problem, let us look at the situation shown in Fig. 2.

Many exploratory activities and some developmental operations look forward to a considerable time lag between actual discovery and ultimate high levels of profitable production. In this early period, costs are high and income, of course, is low or nonexistent. Now, if the potential investor is applying a requirement of, say, 20% return on his money, what result do we find?

Using a 20% discount, dollars earned in 10 years are worth only about 15 cents at the time of investment. Dollars earned in 20 years are virtually valueless currently—about 2 cents in relation to initial money. Thus, although the property BETA in Fig. 2 may earn 15 to 20 times its original investment in 20 years and may be a tremendous future factor in the investor's affairs, it will not measure up to the immediate 20% concept of return.

Clearly, therefore, there is need in this type of analysis for other techniques of investment analysis than the rate-of-return (interest) concept

"It is reasonable to believe these upward pressures will continue."

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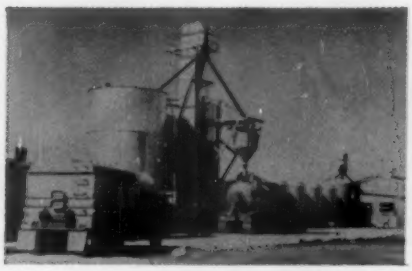

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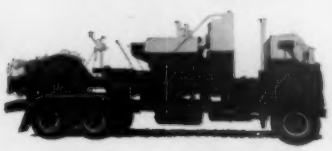


You save drilling dollars with

THE

MUD PROBLEM: Control flow and filtration properties of mud in 3¾″ hole at 20,000′ depth, with temperatures of over 450 F.

WELL DATA

Location: Nicholson Field, Webb County, Texas
Total Depth: 20,603′
Bottom Hole Temperature: 456 F

MUD ADDITIVE PROGRAM

0′ to 6,467′	AQUAGEL*, Q-BROXIN**, caustic soda, quebracho, water.
6,467′ to 12,000′	Gypsum, Q-BROXIN, oil, BAROID*.
12,000′ to 14,790′	DMS†-gypsum, Q-BROXIN, oil, BAROID, MICATEX*.
14,790′ to 20,603′	CARBONOX* and DMS for control of flow properties and filtration, and BAROID for weight.

TYPICAL MUD PROPERTIES

Depth, feet	8,090	12,170	14,085	16,838	18,560	20,420
Weight, ppg	11.9	15.5	17.0	16.9	17.0	13.0
Viscosity, sec. API	51	59	61	46	45	48
Plastic viscosity, cp	31	46	55	30	27	22
Yield point, lb/100 sq ft	10	15	6	11	15	26
Filtrate, ml, API	6.0	3.1	2.1	1.5	2.2	2.2
Calcium, ppm	1000	1760	1360	200	400	200
Filtrate, cc API	7.0	10.8	86.0	12.00	11.2	11.0
tested at	225 F	325 F	375 F	375 F	400 F	400 F

CASING PROGRAM

Size Inches O.D.	*Depth Set Feet*
20	300
13⅜	6,474
9⅝	10,333
7 (liner)	10,126-14,971
4½ (liner)	14,619-18,563

*Registered Trademark, Baroid Division National Lead Company
**Registered Trademark, Puget Sound Pulp and Timber Company
†Registered Trademark, Magnolia Petroleum Company

DISCUSSION: Baroid's experience data indicated probable high temperatures, rock salt and lost circulation in this area. These conditions, combined with small hole drilling at lower depths and the need for mud that would not interfere with logging, made it necessary to control changing mud properties at each stage of drilling.

SOLUTION: An advance mud program was planned. Continuous laboratory, aging, high temperature and filtration tests were conducted. At 6,467′ the treated shale mud was converted to a gypsum—Q-BROXIN mud in the casing. Below 12,000′ mud was treated with DMS to control filtration and flow properties. Below 14,790′ a CARBONOX—DMS mud was used to give trouble-free mud properties to total depth. Changes in mud properties were made without discarding existing mud and without loss of rig time. Mud did not interfere with logging or testing operations. Under changing conditions, extreme temperatures and small diameter hole, the viscosity, yield point, gel strength and other mud properties were maintained as desired at all times.

a Baroid Mud Program

MUD PROBLEM

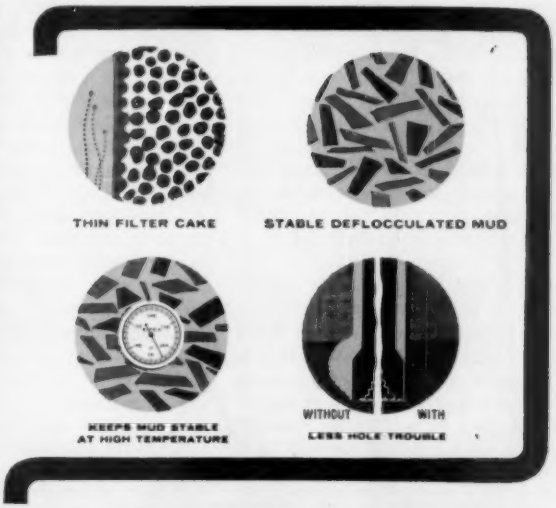
... and its solution

High temperatures and small diameter holes in deep drilling formerly presented serious drilling mud problems. Today, Baroid engineers plan successful mud programs that meet downhole conditions ahead of time and permit drilling to total depth without difficulty.

In this typical case, total depth was 20,603'. The last 1400' of hole were drilled with a 3¾" diamond bit. Bottom hole temperature was 456 F.

An advance program and constant pilot testing indicated every needed change in the mud. In the final stage, a CARBONOX—DMS surfactant emulsion kept mud properties under control as easily as in surface drilling. Logging and testing were done smoothly and successfully.

Baroid has reduced the element of chance and has increased the element of success in your drilling mud program by integrating every step of research, production, distribution and application into a single chain of service. This unified operation keeps your rigs on schedule and *saves your drilling dollars.*



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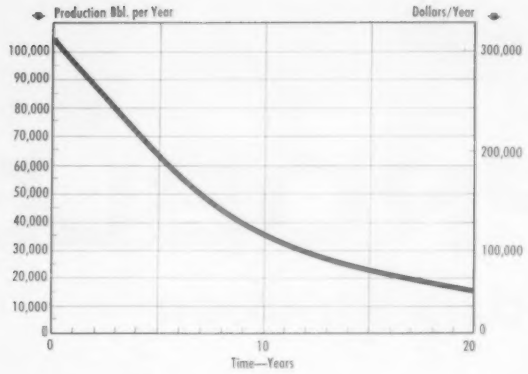
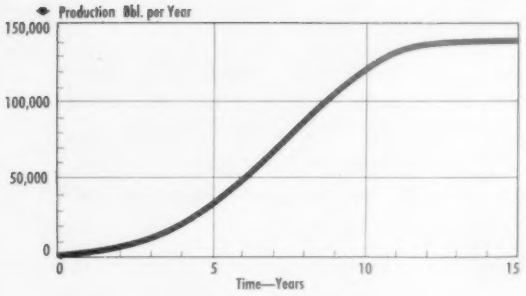


POOL ALPHA, estimated basic production and gross value, figuring a price of $3 per barrel. Fig. 1.



POOL BETA, investment and production, using an investment of $100,000 per year for 5 years. Fig. 2.

alone—or its commonly used companion, number of years to payout of investment.

The answer, then, to our question of whether or not interest discounts should be used must be at least qualified. In many cases they are most helpful. They are specific. They do facilitate decision. But whether or not the answers they give are the whole picture may be another story. The thorough evaluation analyst must recognize the heuristic weakness of these computations in problems that show potential for significant future growth and search for additional methods of presenting results.

Rate choice essential. A second problem in use of interest rates deals with the choice of the rate itself. What is the valuation to be used for? Is it to be primarily a method of choosing between alternative investment opportunities or is it to provide the base for financing arrangements? Does it have a prime purpose in evaluating another organization's position in approaching a negotiation, or does it aim to help define operating plans and programs? In each of these cases—and probably others also—different interest rates will be meaningful to the analyst.

Why is this true? Consider for a moment these various possible uses of the valuation calculation. If the purpose is principally to choose between investment opportunities, the real question concerns what rate of return can be expected from the reserve in question—not what price should be paid using a predetermined interest rate. If a value is known for one property, the rate it provides for that property would become the rate that has to be improved upon if an alternative is to be considered more attractive. If investments in other forms (other oil industry activities or, perhaps, other affairs entirely) are involved, the rate of return on these investments will be the base for the reserve valuation in question.

Thus, between two properties, it is not sufficient to know the valuation of each at a datum of, say, 10% interest. All this does is set a price for each property that makes them both equal in anticipated value. The real question is what value is proper at the interest rate that correctly reflects all other investment opportunities.

If the valuation is to form the base for financing, a totally different concept is essential. The financing organization is interested in a valuation that will assure adequate protection of its funds—both principal and interest. In this case, alternative investment choice is not the problem—soundness of the financing is. This means that the valuation interest rate should be closer to the financing rate itself—with a reasonable factor of safety in both rate and production estimates to protect against error. The rate used, however, is based on a totally different analytical procedure and justification, and both parties in the contemplated transaction should recognize this in reaching their conclusions.

Within the scope of this article, it is only possible to point out that a wide range of similar questions must be answered before setting a rate that will be useful in evaluating a competitor's position when approaching negotiations or in making operating decisions based on comparative valuations. Clearly, in preparing for negotiations, it is not sufficient to have a generalized valuation in mind—or even a specific calculation based on one's own alternatives. It is equally important to make an effort to understand the other party's alternatives as specifically as possible. This requires a good real of review of appropriate interest rates and a sophisticated judgment in their use.

The same is true when approaching operating decisions. There can be no simple, regularly used, rate that will be usable in determining value when setting a development program considering secondary recovery, evaluating gas-injection timing, and the like. These decisions involve commitment of resources—either financial or physical—and must be based on comparative opportunities and long-range planning objectives. Clearly, these questions involve careful management review and coordination with over-all company or personal business strategy.

Payout and the Long-Range Plan

In addition to the many problems involved in determining an appropriate rate of interest for analytical use, there is a considerable tendency to use payout calculations rather than rate-of-return computations in answering many of the questions just raised. And this immediately raises the question of evaluation of long-range potential that we have discussed in relation to interest rates. If an arbitrary payout requirement is used, the investor will often cut himself off from the great growth opportunities that are involved in situations that present a large development potential after several years of relatively low return.

Price-trend effects in an economy and world such as ours must be considered. Surely, also, interest and payout must be used carefully—and in many cases involving future potential growth these two concepts must be used only in conjunction with thorough presentation of the potentials involved.

None of this can be done without a reasonably well-thought-out long-range plan of investment and without a clear policy regarding economic factors. The second section of this article will discuss some of the other economic factors of importance in valuation practice and will briefly review techniques that can be used in arriving at important answers.

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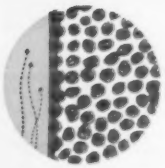
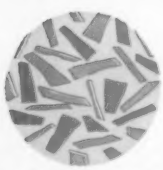
Use DMS for a surfactant mud system that resists adverse conditions at great depths and high temperatures. DMS is one of Baroid's complete line of mud products that is available through a single, coordinated chain of service that *saves your drilling dollars.*


THIN FILTER CAKE


STABLE DEFLOCCULATED MUD

KEEPS MUD STABLE AT HIGH TEMPERATURE

LESS HOLE TROUBLE

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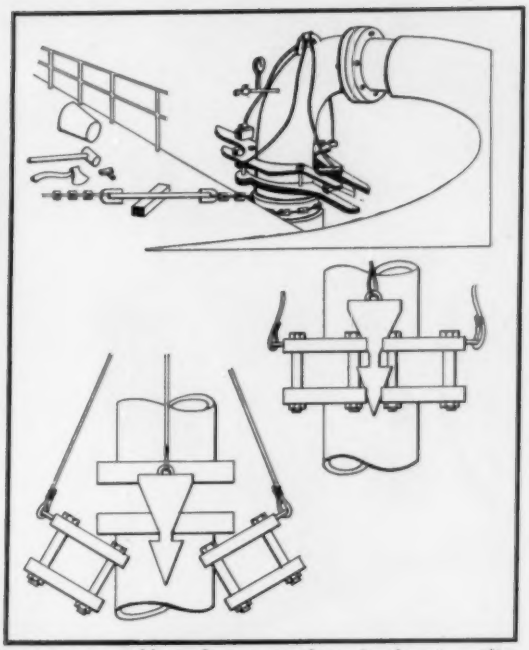


WORKER in photo uses equipment shown in the top part of the drawing to quickly unfasten coupling. In drawing, diagram at bottom left shows the coupling not yet fastened, and at center right the coupling is shown closed.

New coupling speeds loading of ships during storms

A QUICK-RELEASE coupling used at the Sidon, Lebanon, terminal of Trans-Arabian Pipe Line Co., permits loading to continue during storms or other emergencies.

The coupling, recently patented, joins submarine loading hose to a tanker by means of a deck hose. It is believed to be used only by Tapline.

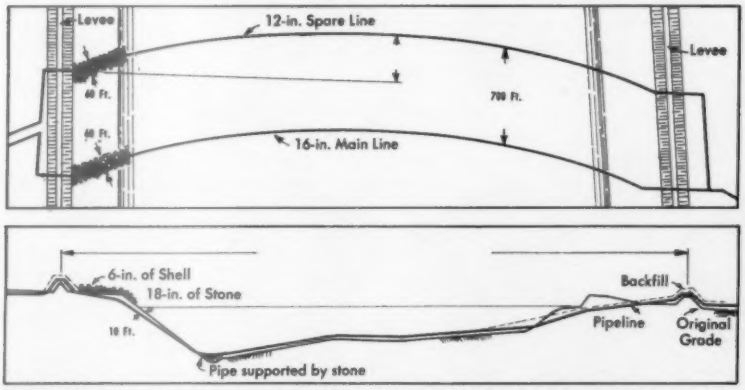
Development of the coupling started some 9 years ago when Capt. A. A. Brickhouse, Sidon terminal superintendent, was dissatisfied with conventional couplings. Ships using them generally had to disconnect their hose and stop loading during storms.

Conventional couplings required 4 to 5 minutes to disconnect; ships sometimes had to break the loading hose and, as a result, lose a large amount of oil.

Capt. Brickhouse called on the 10 Sidon mooring masters to develop a better coupling. A pooling of ideas resulted in the coupling for which a patent was obtained at the suggestion of John Noble, Tapline president. This coupling can be released in 10 to 30 seconds with a few strokes of a mallet (see photo), without loss of oil or damage to hose or tanker.

The coupling joins two flanges by means of two externally bolted outer clamps with wedges inserted. In conventional designs, on the other hand, the coupling is bolted directly through the flanges.

Shell uses new way to cross Mississippi with pipelines



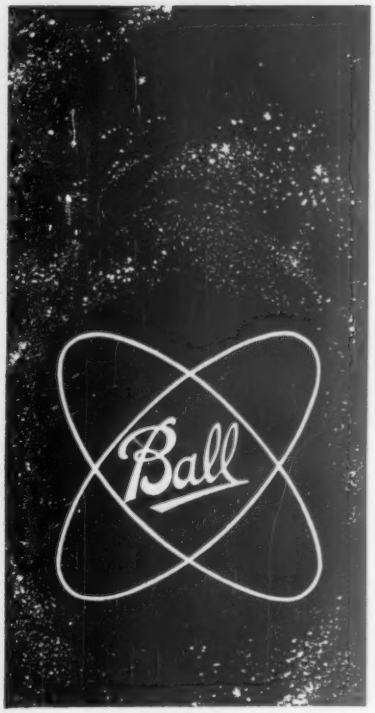
PLAN VIEW (top) and elevation view show method of laying 16 and 12-in. pipelines across the Mississippi River. Fig. 1.

AN INNOVATION of construction practices in the Mississippi River Delta area is the installation of a major pipeline in a backfilled ditch.

This method was used on the main line of Shell Pipe Line Corp.'s 105-mile, 12, 16, and 20-in. crude-oil line from Delta area fields, South Louisiana, to the Norco refinery of Shell Oil Co. (OGJ, April 27, 1959, p. 166). Most pipelines in this vicinity have been installed in canals; a few have been installed in open ditches.

Another innovation on the project

From "Design and Construction Features Employed on the Delta Pipeline," by D. C. Simpson, Shell Pipe Line Corp., presented before ASCE Pipeline Division, New Orleans.



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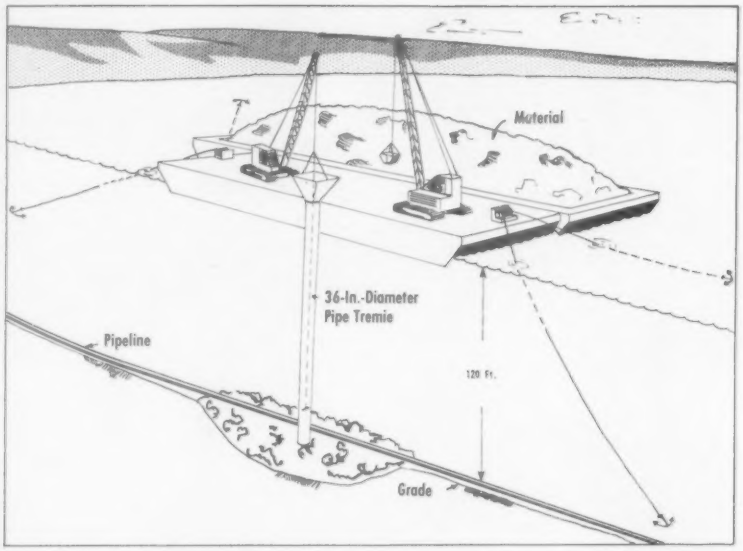


PIPE TREMIE was used to place more than 2,000 tons of stone under and around suspended pipe section. Fig. 2.

is the restorative method used to support underwater suspended pipe sections at river crossings.

Main-line construction. The main line was installed in a ditch and the ditch was backfilled to provide a minimum of 3 ft. of cover over the pipe. The ditch was backfilled to protect the pipe from marsh buggies and to prevent pirogue traffic in the ditch.

The ditch was excavated with marsh draglines or track-type draglines, operating on wooden mats, to a depth of 5 to 7 ft. The top of the ditch was widened to about 10 ft. Spoils were placed on each side of the ditch consuming a total right-of-way width of about 60 ft. A minimum right-of-way width for this type of construction is considered to be 80 ft.; a 100-ft.-wide right-of-way, which was procured for the Delta line, is recommended. The area outside the spoils on each side of the ditch is used for marsh-buggy traffic.

The pipe was welded, the welds were X-rayed, and the field joints were coated on a barge which was located in a bayou or canal accessible to navigation and crossing the pipeline right-of-way. A 100% X-ray of all field welds was made. The pipe was then pushed from the barge and floated down the pipe ditch as successive joints were welded to the pipe section.

In some instances marsh buggies were used at the end of a pipe section to guide the pipe in the ditch and to provide a pulling force. Sections as long as 5 miles were floated into place prior to filling the line with water and submerging. Points of intersection or bends in the main line were held to a minimum especially at locations not accessible by water transportation. However, if necessary, field bends were carried by marsh buggy to the point of intersection not accessible by water and welded to pipe sections which had been floated down the pipe ditch from opposite directions.

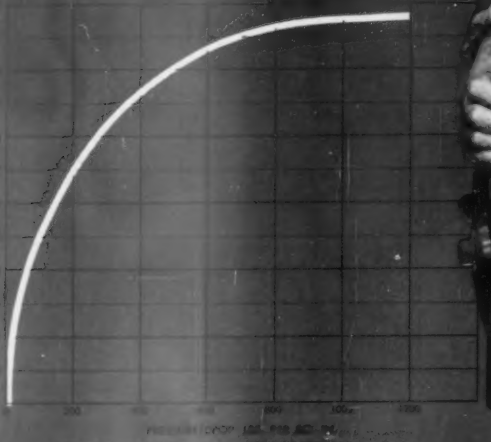
In general, if points of intersection had offsets of less than 10°, the pipe could be pushed or pulled around the point without the necessity for a field side bend. Banks of all canal and bayou crossings were excavated to a gradual grade to permit the pipeline to traverse the stream without the need for field sag bends or overbends. Backfilling of the pipe ditch was done with a marsh-type backfiller.

After the pipeline had been installed, it was purged and all air eliminated by pumping water behind a pipeline pig. A field hydrostatic test was made on each pipeline section. Leaks which occurred during the test were located by filling the line with a green dye consisting of water and fluorcein di-sodium salt. Leaks could then be spotted readily from the air.

River crossings. At Nairn (Fig. 1)

Flow area thru UNIBOLT ADJUSTABLE WING VALVE
Passes Large Quantities of Fluid or Gas

FLOW OF WATER THROUGH UNIBOLT CHOKE
WITH 1" SEAT



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6. Full 2½" pilot for true stem alignment and rigidity.
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10. Can be converted to "Pressurematic Safety Valve" by simply changing bonnet assemblies.
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PIPELINING

a 254-ft. upstream camber was used for both lines; at the Destrehan crossing of the Mississippi the main line has a 187-ft. upstream camber whereas the spare line has no camber and extends straight across the river.

Before laying the crossings, the foreshores and banks were excavated to a maximum cut permissible by the U. S. Corps of Army Engineers and pipe was triple-jointed and coated on shore. As the pipe was laid from a lay barge, field joints were X-rayed, coated, and jeeped.

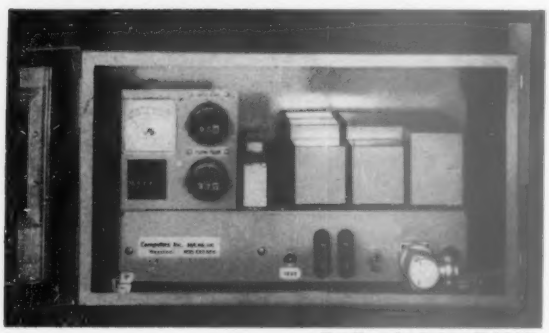
Four to five pipe-lowering barges spaced about 120 ft. apart were used behind the lay barge to control the pipe bending and insure that pipe stresses did not exceed the yield strength. All lines were laid on the river bed. Once laying started, it took only 36 hours to complete the crossing, thereby causing a minimum of interference to ship traffic.

Spoils placed on the foreshore during ditching were used as backfill material for that portion of the pipe ditch on the foreshore and extending to the minus 20-ft. elevation. The ditch below that elevation was filled with material pumped hydraulically from a location immediately upstream in order to provide a toe or support for the upper material. Backfilling of the pipe ditch at the west bank of the river crossings at Nairn was prohibitive because of the steep bank and excessive water depths.

At Nairn the west foreshore and at Destrehan the east foreshore were rip-rapped with 6 in. of shell and 18 in. of stone over an area 60 ft. wide, centered on the pipelines, and extending from the levee to the low-water line. This was designed to guard against soil erosion in the immediate vicinity of the pipeline.

Suspended pipe support. Several suspended pipe sections were found after the lines were installed. The most critical was located on the main line at Nairn in 120 ft. of water. The suspension located outside the ditch area and where water velocities are highest was 12 ft. maximum from the river bed and covered a span of 60 ft.

To make this repair or support, a 36-in.-diameter pipe tremie was used to place some 2,200 tons of stone under and around the suspended pipe sections as shown in Fig. 2. The use of heavy stone, placed by using a pipe tremie, has proved quite satisfactory in support of the underwater suspended pipe sections.



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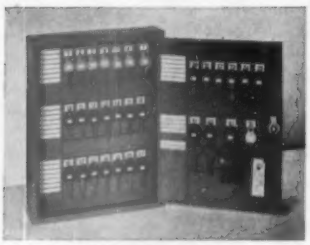
This week's SHOWCASE features . . .



A practical way to identify keys

KEY identification system promises to solve the problem of "floating" keys. It's based on visual control through color. Called ColorCap, it is adaptable to installations with requirements from 5 to 99,900 keys. Basically, the system consists of pliable synthetic caps in 10 colors that fit every type of lever and cylinder-lock keys. The caps are fitted with removable labels and housed in specially built cabinets that include hooks adaptable to keys of any shape or size. Source: **Saxton Barrett Co., 2251 Lincoln Avenue, Altadena, Calif.**

Grinding or buffing

. . . made easier with a magnetic gun chuck you can now obtain. It is a single cast-aluminum handle with a pistol finger grip and safety trigger release to assure easy handling of materials. According to the maker, the tool maintains a tight grip on objects without the use of clamps or makeshift tools.

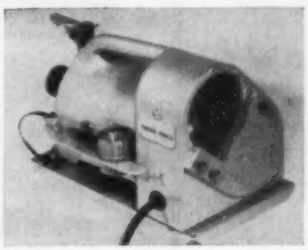
The maker says the tool can be attached to heated steel objects for easy handling without loss of magnetic penetration, and it permits easy placement of materials for tack welds. Source: **Smith's Magnet Sales Co., 15932 Minnesota Avenue, Paramount, Calif.**

●

Variable-capacity rotary pump

. . . a positive-displacement type, comes in eighteen sizes with capacities from 0-1 to 0-3,000 g.p.m. with discharge pressures to 450 psi. in a single stage. The Ro-Var Plenty pump is completely reversible, as well as infinitely variable in capacity, all at constant drive-shaft speed and rotation. The pump is expected to prove useful for blending, reversible-flow loading-unloading operations, and remote control of pumping rates through air or electrically operated positioners mounted directly on the pump. Source: **Fluid Equipment Div., Kearney Industries, Box 501, South Plainfield, N. J.**

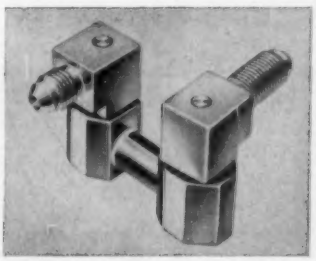
●



Copper tubing

. . . cleaned by a machine which deburrs it as well as fittings at a cost less than present machines used for similar operations, the maker claims. The portable Toled-O-Matic No. 1 Buff-Ezy machine cleans and deburrs all sizes of tubing up to 4 in. It is fitted with a handle, weighs only 52 lb., and is powered by a ⅓-hp. single-phase motor. Source: **Toledo Pipe Threading Machine Co., Toledo 3, Ohio.**

●



Ball-bearing swivel connector

. . . for pneumatic or fluid applications requires only a low torque under full operating pressure due to a balanced design. Available in most materials, the connector comes in single and multiple swivels. An example of the product line is the twin-mounted

Want more facts about equipment or copies of product literature described in this issue?

Send this **Showcase Coupon**

to manufacturer at address shown in bold type after each item.

Product name, Model no., literature title or number: .....

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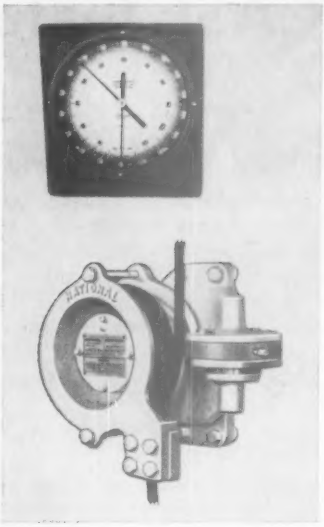
SMALL RIG INDICATOR

NEW • NEW • NEW • NEW • NEW

MARTIN-DECKER TYPE "G"

for the Small Drilling Rig Workover or Production Hoist

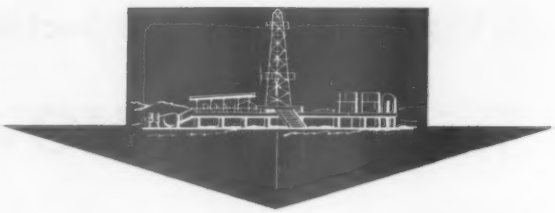


The new Type "G" Weight Indicator, is a scaled down model of the Martin-Decker Type "D", "E" and "FS" Weight Indicators. It includes the SENSATER permanently mounted in the Deadline Anchor and all other advantages of the larger units, yet it is light and small enough for the stringent requirements of portable rigs.

MARTIN DECKER

WRITE FOR BULLETIN D-P95
MARTIN-DECKER CORPORATION
3431 CHERRY AVENUE, LONG BEACH 7, CALIF.

WORLD'S PRINCIPAL MANUFACTURER OF OIL WELL DRILLING INSTRUMENTATION



OIL LOANS

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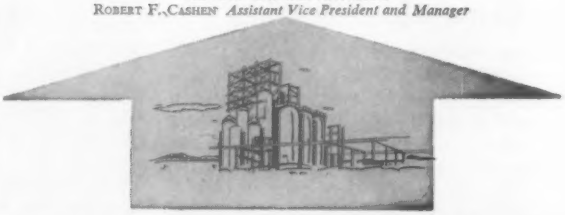
LOUISIANA'S OLDEST BANK

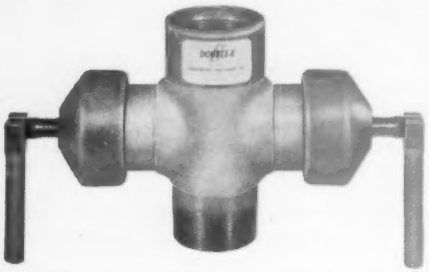
OIL AND GAS DEPARTMENT
ROBERT F. CASHEN *Assistant Vice President and Manager*



DOUBLE-E

SAFE
STRONG
SURE!

BLOWOUT PREVENTER



Holds to 3,000 psi against all diameters 0" to 1½". Prevents blowouts when you pull rods or replace stuffing box rubbers.

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- Launders wiping rags, gloves, coveralls, uniforms, waste, etc.
- Operators require no special training.
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- AC-DC models available. 25-50-75-100 lb. sizes, 8 models, 2 styles.

For illustrated brochure and name of nearest distributor write

Cook Machinery Co., Inc.
4301 S. Fitzhugh Ave. Dallas 10, Texas

swivel. It is made of stainless steel and weighs only 9 oz. It operates at pressures from 0 to 3,000 psi. and over a temperature range from −65° to 275° F. Source: **Airaterra, 620 Paula Avenue, Glendale 1, Calif.**

●

Electronic computer

. . . automatically measures frequency and random events per unit of time or, with a manual-gate feature, totalizes electrical events. With transducers, it also provides convenient measurement of such mechanical qualities as speed, weight, pressure, temperature, and acceleration, the maker says.

Frequency range is 1 c.p.s. to 1.2 mc. Display time is adjustable to about 15 seconds, or readings can be held until manually reset. The Model 521G counter has a self-check feature to confirm accuracy of operation. Source: **Hewlett-Packard Co., 275 Page Mill Road, Palo Alto, Calif.**

●

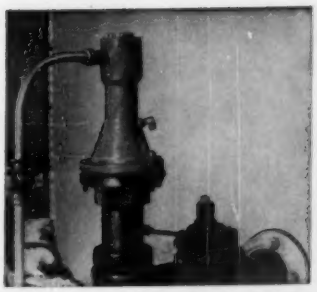
Pipe-fitting

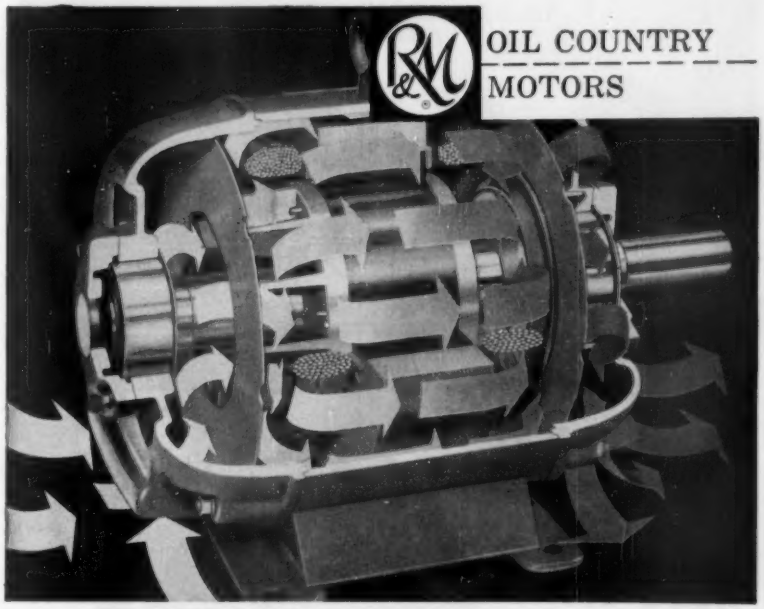
. . . insulation of molded glass fiber comes in four thicknesses—½ through 2 in. Trade-named Fitrite, the product comes in standard sizes for welded and cast ells, tees, and special shapes. The insulation comes in two molded halves which fit together. The maker claims it is easily installed with staples, soft wire, or tape. Once in place, the insulation can be finished with canvas or vapor-barrier casings. Source: **Fibrous Glass Products, Inc., Alpha Plaza, Hicksville, L. I., N. Y.**

●

Switch controls

. . . liquid level in tanks and is designed to operate gathering-system and pipeline pumps. The PVSC pressure and level-control switch, used as a level control, can be installed in the market line to detect variations in hydrostatic head in a tank and start and stop pumps at desired high and low levels. It can also operate alarm systems or motor valves. The switch is CSA approved for Class 1, Group D hazardous locations. Source: **Engineered Oil Controls, Ltd., Edmonton, Alta., Canada.**





COOL R&M Performance

Increases bearing grease life 52%

New Robbins & Myers "All Weather 40" Oil Country Motors have a heat rise of only 40° C. with rodent screens installed, compared to 55° or higher for other makes of motors. A leading bearing manufacturer proved grease lasts 52% longer when rise drops from 55° to 40° C. Cooler performance by R&M motors means less maintenance, longer bearing life, longer service intervals. When you consider buying motors from 1 through 200 HP, remember that Robbins & Myers Oil Country motors give you these important maintenance savings. Write for Bulletin 520-OG

ROBBINS & MYERS, INC.
MOTOR DIVISION • SPRINGFIELD, OHIO

Plastic safety hat

. . . contains no metal parts and is extremely lightweight. The Dielectric Hedgard hat is individually dielectrically tested to meet EEI Specification AP-1 1959. It is strong enough to withstand repeated 40 ft.-lb. impact tests, the maker says. Molded lugs on the brim permit attachment of chin strap. A plastic snap-in suspension permits adjustment for head sizes from 6½ to 7¾. Source: **Davis Emergency Equipment Co., Inc., 45 Halleck Street, Newark 4, N. J.**

●

Impervious graphite

. . . rupture disk works in two directions and so protects against implosion and explosion at the same time at pressures up to 150 psi. Each burst setting can be different from the other. The D-disk is accurate to ±5% of rated burst, the maker claims. It is nonporous and mounts in standard ASA flanges. Source: **Falls Industries, Inc., Aurora Road, Solon, Ohio.**

●

Fan

. . . moves corrosive fumes and gases. The fan comes in three basic wheel designs in all AMCA standard wheel sizes from 19⅛ to 64⅜ in. A range of 11 inlet sizes from 11 to 37 in. and five arrangements meet the needs of many processes. The air-handling wheels in the fan line have backwardly inclined blades. The housing is of heavy-gage steel and arc-welded with vertical and horizontal angle-iron bracing. The fan can be obtained with various corrosion-resistant coatings or built of corrosion-resistant metals. Source: **Trane Co., La Crosse, Wis.**

●

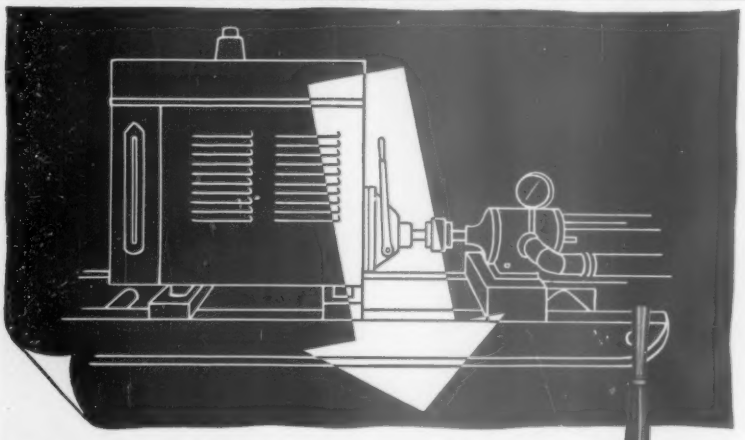
Bench stand

. . . stores small parts conveniently. Available in 18 and 36-in. widths, the bench stand is welded together and made of 18-gage steel. Fitted with leveling adjustments, it has chrome buttons that permit easy sliding on the bench area. The trays measure 2½ in. deep by 4½ in. long and come in five widths from 3 to 7 in. Source: **Skyline Electronics, Inc., 1828 South Bannock, Denver.**

●

Newest pump

. . . for shallow wells called the Moyno, is a submersible type designed to handle low-volume shallow wells. It operates completely submerged in the well and requires no jack, sucker rods, above-ground motor, or gear box. It pumps by creating a progressive cavity, which, the maker says, permits it to handle a full range of high-gravity oils with entrained sand and silt without damage to the pump. The only moving part is a hard chrome-plated tool-steel rotor that



POWER when you need it!

Year after year . . . Rockford PTO's work smoothly, efficiently, and without maintenance in the Oil Fields. Now they are being specified by more and more oil men as a dependable component of new equipment. Next time, specify a Rockford Power Take Off and rely on the fact, you've selected the best — write for information and specifications.

Available in a wide range of sizes for all popular makes of engines.

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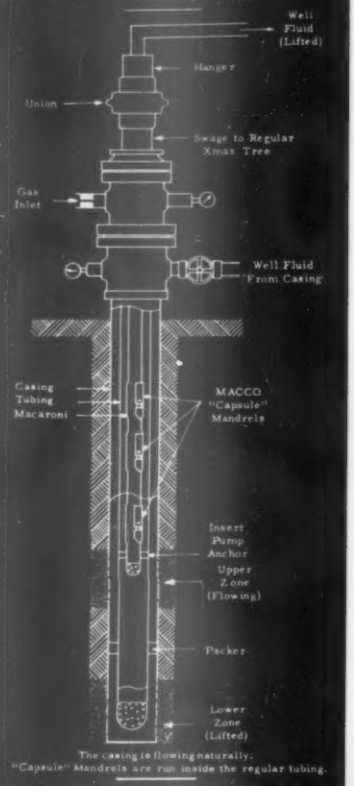
Export Sales Borg-Warner International 36 So. Wabash, Chicago, Ill.

MACCO

MACCO MULTIPLE COMPLETION AND SLIM HOLE EQUIPMENT

The "capsule" type mandrel is available from stock for all standard multiple string, macaroni, and slim-hole gas lift. Special sizes are manufactured upon request. With the valve and check valve mounted inside, this type of mandrel provides extra large flow areas for the well fluids. The producing zones of parallel or concentric multiple completions may be simultaneously lifted by either a "common" or "separate" gas supply. **Macaroni tubing lowered inside of the regular tubing has proved a highly successful means of lifting wells where it is objectionable to pull the regular tubing.** Efficient lift inside of small liners is also made possible.



The casing is flowing naturally. "Capsule" Mandrels are run inside the regular tubing.

Macco manufactures many different types of multiple completion equipment to fit any well requirement. For further information, write for Brochures Nos. 3-12, 3-13, 3-21, 3-31 and 6-12.

MACCO OIL TOOL COMPANY, INC.

Houston 8, Texas

1521 Prince P. O. Box 7288 Houston 8, Texas

Phone UN 1-1253

MACCO equipment is also available in sterling areas from Williams & James (Oil Tools) Ltd., Gloucester, England

turns within an oil-resistant rubber stator. The pump is easy to move from one well to another. Source: **Fernholtz Machinery Co., 8468 Melrose Place, Los Angeles 46.**

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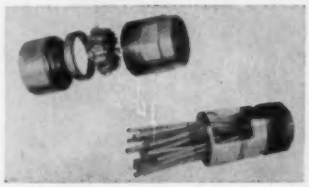

Mechanical connector collet

. . . provides a positive wire shield ground and strain relief for multipin electrical connectors. The Totco connector collet is designed for use with both solder and crimped terminals. It offers a way to do away with the wire breakage at terminals and serves as a shield against radio-frequency radiation interference at plugs. When used with a crimped type of terminal, the collet provides a mechanical connection that does not require soldering. It comes in 4, 19, and 55-pin models. Source: **Technical Oil Tool Corp., 1057 North La Brea Avenue, Los Angeles.**

•

Improved antiseize

. . . thread compound is available to lubricate and seal bolts, studs, flanges, and other equipment at high pressure and at temperatures up to 1,800° F. The Fel-Pro C5-A compound can also be used in below-freezing weather, the maker reports. The product comes in both tubes and cans. Source: **Felt Products Mfg. Co., 7450 North McCormick Boulevard, Skokie, Ill.**

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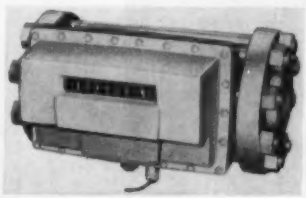

Mass flowmeter

. . . for natural gas measures gas directly in pounds, eliminating calculations for conversion of volume to weight. Prototype production units have been successfully field-tested on seven gas production and transmission

CORROSION?

CORBAN

Corban®, the Dowell family of polar-type corrosion inhibitors, is offered in 17 varieties to meet — and combat — well corrosion problems. Corban comes in three forms: "ready-to-use" liquid, concentrated liquid, and sticks. Also more than a dozen formulas — for sweet crude, sour crude or gas condensate wells. Available immediately at 150 points in the oil country through Dowell offices and stations.

Products for the oil industry

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DIVISION OF THE DOW CHEMICAL COMPANY

DIAL DOWELL

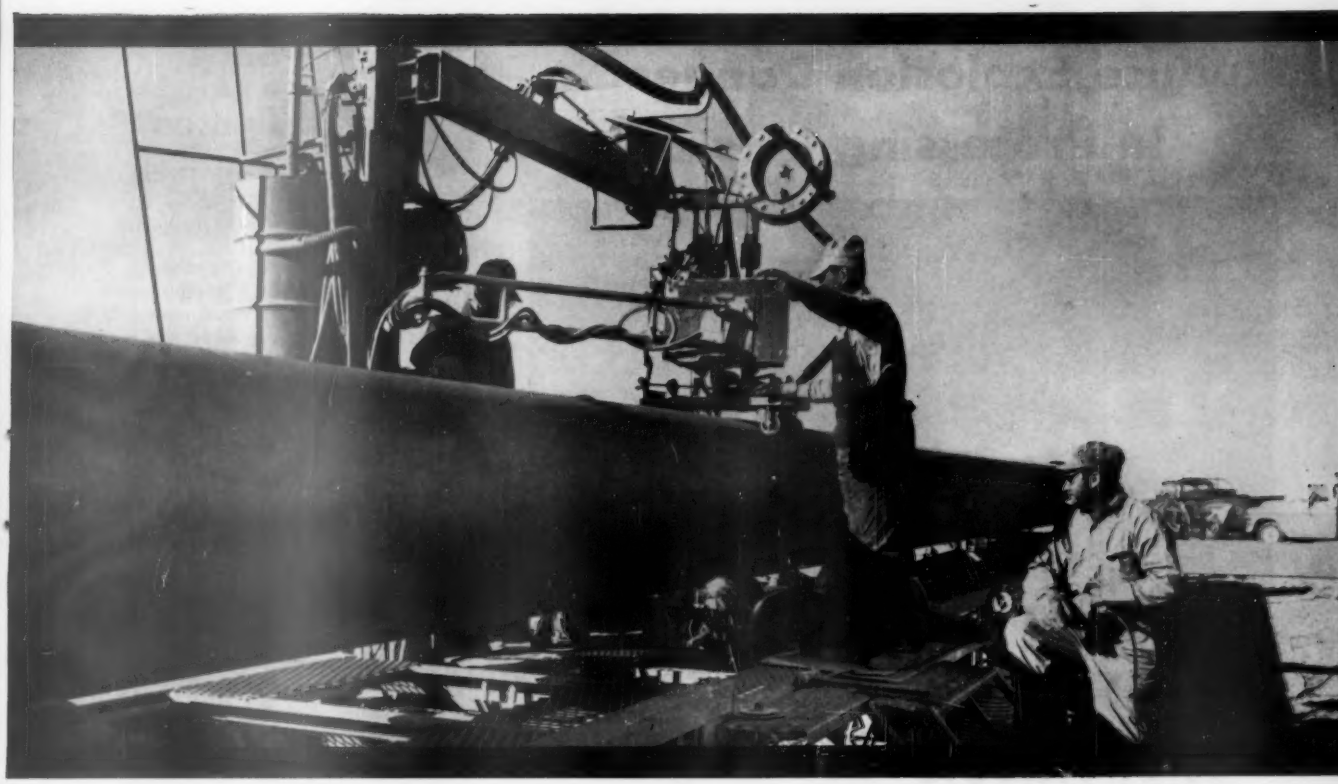
Double-jointing 30-in. steel pipe into 80-ft lengths

speeds Transwestern "big inch" line

Steel *for Strength*
. . . Economy
. . . Versatility

Another product frequently seen on spreads in the Southwest is Bethlehem's electric resistance-weld line pipe, available from 5 9/16 in. through 16 in. OD.

It was plenty cold west of Roswell as the coating and wrapping crews "did their stuff."



Transwestern Pipe Line Company's "big inch" from West Texas to the Arizona-California border is a big job with a big objective —to deliver 300 million cu ft of natural gas per day to Southern California utilities. This calls for the construction of gathering systems and laterals in the Permain Basin of Texas, and in the Panhandle fields. And it requires laying main line of 30 in. OD pipe from Roswell, New Mexico, clear to the California-Arizona border.

Double-jointing in the field

There's plenty of Bethlehem Line Pipe on the job, including the entire distance between Compressor Stations Eight and Nine west of Roswell. On this spread Houston Contracting Company used a new technique—double-jointing the pipe in a yard with special pipe handling and automatic welding equipment. The 80-ft joints mean more footage per truckload, cutting both delivery time and costs. It also resulted in excellent, low-cost welds, with a corresponding reduction in the number of slower, costlier field welds.

Gulf Interstate Company is handling a major portion of the engineering and design of the Transwestern project.

You'll find Bethlehem Line Pipe in all diameters on spreads throughout the land. It's good pipe, made to the highest standards on mills that rank with the finest. We'd be happy to give you more information. Just contact the Bethlehem sales office nearest you.

NOW AVAILABLE IN ALL SIZES MEETING API SPECIFICATIONS

	SIZES (in., OD, incl.)	WALL THICKNESS (in.)	LENGTHS	SPECIFICATIONS
HYDRAULICALLY EXPANDED ELECTRIC FUSION-WELD (submerged arc)	18 to 42	¼ to ¾ incl.	40 ft	API 5LX, Grades X42, X46 & X52 Also X-56
ELECTRIC RESISTANCE-WELD	5⅝ to 16	API	to 60 ft	API 5L, Grades A & B API 5LX, Grades X42 & X46
CONTINUOUS BUTTWELD	½ to 4½	API	SRL 24 to 26 ft DRL to 50 ft	API 5L

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- **Wide Turn-Down Ratio**
- **Minimum Corrosion . . .**

Combustion chamber is designed to minimize the formation of partially oxygenated and corrosive compounds

SIMPLE . . . RUGGED . . . COMPACT

The John Zink inert gas generator is so compact it requires less floor space than any other comparable unit.

Flanged components are used throughout for easy servicing. Each part may be removed without interfering with any other part.

The easy, economical way to provide maximum safety and efficiency for your plant and personnel in purging, storing, conveying and controlling in a variety of process operations.

WRITE FOR BULLETIN G-59

John Zink COMPANY

4401 S. PEORIA TULSA, OKLAHOMA

SHOWCASE . . .

New Equipment

locations, the maker reports. Models of the meter are also available for industrial-gas and ethylene-gas applications.

The new meter promises to substantially reduce the cost of computing operations required in measurement by volume. Completely self-contained, the meter weighs about 10 lb. Source: **Black, Sivalls & Bryson, Inc., 7500 East Twelfth Street, Kansas City 26, Mo.**

●

Sucker rod kinks

. . . eliminated with a new rod elevator just put on the market, according to the maker. The rod elevator reportedly will not bend or kink sucker rods even under the heaviest loads. The elevator has a reversible U-shaped body pivoted in the elevator bail. Stops prevent rotation about the trunnion under load. Freely pivoted, the bail swings out of the way or stops upright to receive the hook.

The unit comes in a light type for strings of average length and a heavy type for longer rod strings. Both types come in ⅝, ¾, and ¾ to ⅞-in. combinations. The light type also comes in a ½-in. size and the heavy type in a ⅞-in. size. Source: **Byron Jackson Tools, Inc., Vernon Ave. at Thomas, Los Angeles 54.**

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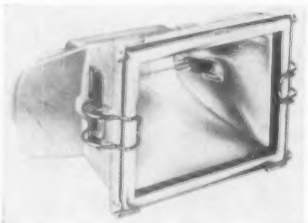


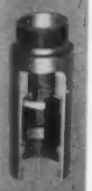
New lamp

. . . gives strong light and lasts twice as long as a conventional 500-watt lamp, the maker claims. The Model G-6000 Intenso Quartzlite 500 lamp lighting unit reportedly produces up to 19% greater light than a conventional 500-watt lamp. It maintains a 21-lumens per watt output throughout a 2,000-hour lamp-life rating, the maker reports. Source: **Appleton Electric Co., 1701 Wellington Ave., Chicago 13.**

Let R-u-b-b-e-r Take The Wear

in your sucker rod pumps

IT COSTS YOU LESS THAT WAY



● MARTIN RUBBER & DUCK RINGS give excellent life in dirty abrasive fluids . . . high or low gravity . . . much or little water . . . shallow or deep wells. They last for years in the easier pumping wells. Replacement rings cost comparatively little.

● MARTIN PLUNGER BODIES, precision grooved, drilled and threaded (no underneath fluid passage), usually last for years. Tube or barrel costs are often cut in half.

● The replaceable SYNTHETIC RUBBER GUIDES in MARTIN CAGES last longer than any metal, and the cushioning of the ball increases your ball & seat life. Results are often truly amazing. (Patent No. 2,591,174)

Write for our new 1960 catalog or see it in the new Composite (24th Edition). All products sold thru supply companies.

JOHN N. MARTIN

Manufacturer

9 W. READY STREET • TULSA, OKLAHOMA

SHOWCASE . . .

New Literature

Fittings catalog

. . . features all-aluminum construction for safe, explosion proof, nonsparking, lightweight construction throughout—UL approved to meet safety requirements. The publication describes junction boxes, special fittings, connection blocks, sealing fittings, unions, plugs and receptacles, switches, pilot lights, and explosionproof fixtures. Dimensional drawings are shown along with illustrations of fittings. Source: **Killark Electric Mfg. Co., Vandeventer and Easton Avenue, St. Louis.**

Moisture

. . . and density probes are outlined in a new two-page bulletin recently published and now being offered to interested parties. The bulletin gives specifications and photos showing the correct use for both moisture and density tests in conjunction with soil-compaction work. The nuclear surface moisture probe (Model NU-3) is designed to measure the amount of moisture in materials on the job site without disturbing any of the material under test. The nuclear surface density probe (Model NU-2) is designed to measure density on both organic and inorganic materials. Source: **Soiltest, Inc., 4711 West North Avenue, Chicago 39.**

Valves condensed catalog

. . . has just been made available presenting operating specifications, characteristics, sizes, ratings, and illustrations in easy-to-read tabular form. Designated Catalog 10-A, its 16 pages contain descriptions of bronze, iron, and forged-steel gate valves; bronze and iron globe and angle valves; bronze and iron check valves; asbestos-packed iron cocks; bar-stock valves; valve parts; steel and forged-valve accessories; and cast-steel valves. Source: **American Chain & Cable Co., Inc., 929 Connecticut Avenue, Bridgeport 2, Conn.**

Formation-treating

. . . service called Rockshock employs the implosion of glass capsules to generate powerful pressure waves, as discussed in a new technical report now available. The report notes that in an implosion the initial force is directed inward rather than outward. This force

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Dependability – FMC protects the refiner by producing ignition control additives from basic raw materials...assuring you of optimum quality control throughout the production process, and providing you with a dependable source of supply for these products.

Manufacturing skill–FMC has a reputation for technical know-how based on more than 25 years of experience in the production of organic phosphorus compounds.

Choice of products – FMC offers you several phosphorus compounds for consideration as combustion deposit modifiers . . . will soon be in a position to supply new compounds, enabling you to choose the additive best suited to your particular conditions.

If you need a phosphorus additive to eliminate engine knock, reduce surface ignition and spark plug fouling, you can rely on the experience and facilities of FMC. Write for more information about FMC gasoline additives. We will be glad to show how these products can meet your most exacting specifications.

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Economy in Drilling
is a must... and we're
doing something about it.
Every member of the entire Milwhite organization
is continually at work for decreased drilling costs
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HOUSTON, TEXAS
DIVISION OF MISSISSIPPI RIVER FUEL CORPORATION

is followed by an outward-directed shock wave. The four-page literature offers sections on introduction, purpose and descriptions of the service, descriptions of capsules, where the service is applicable, and case histories. Source: **Dowell Division of The Dow Chemical Co., P. O. Box 536, Tulsa.**

Computer-control

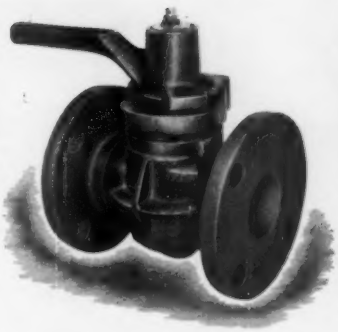
. . . Bulletin S-4019 has been published in an effort to cut through the confusion surrounding the subject of process computer control. Written in layman's language, the 28-page booklet gives answers to some common problems of computer control and provides details on a step-by-step method for developing a reliable computer control system with a small amount of capital. The booklet takes you through the initial feasibility study stage, through the individually justified intermediate steps, to the completion of a fully automated control system composed of conventional building-block components. Source: **Technical Information Dept., Beckman Scientific & Process Instruments Div., 2500 Fullerton Road, Fullerton, Calif.**

Control valves

. . . are illustrated in a new eight-page semitechnical bulletin which is designed for easy finding of valve types for specific product and application problems. Accompanying each valve type is the following information: functional data, photo, description, explanation of operation, color-coded flow diagram, specifications, and specifying information. Bulletin 668A gives schematic installations for typical uses. Source: **Ralph N. Brodie Co., San Leandro, Calif.**

Industrial insulating

. . . materials brochure contains properties and specifications of more than 30 heat and cold insulations for service from below zero up to 1,900° F. The 24-page publication describes and illustrates spun mineral wool, calcium silicate, and 85% magnesia products in block, blanket, felt, fill, cement, and pipe-insulation forms. Thermal conductivities and tables of recommended thicknesses are given for each product for appropriate temperature ranges. Illustrated application instructions are included, along with a selection chart which indicates the temperature range of different types of material. Source: **Industrial Insulation Div., Baldwin-Ehret-Hill, Inc., 500 Breunig Avenue, Trenton 2, N. J.**



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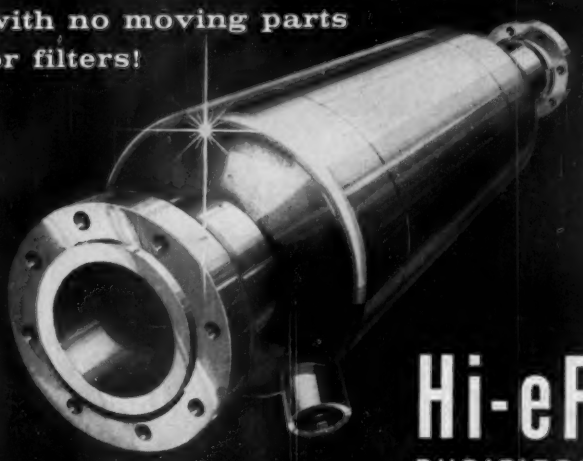
This DeZurik Valve will deliver more valve value than any other valve!

In sizes from ½" thru 24", with a complete line of actuators for remote and automatic operation. Write for details, or see the DeZurik representative in your area.

DeZURIK CORPORATION
SARTELL, MINNESOTA

imagine a gas scrubber with no moving parts or filters!



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Once installed Hi-eF Purifiers scrub gas at virtually no maintenance cost.
There are no screens to clean or filters to replace.
Scrubbing is accomplished without use of moving parts.
Investigate this low-cost way of keeping pipeline processes absolutely clean.
SPECIFICATION MANUAL 601 contains data on seven leading types of purifiers, separators, mist extractors, scrubbers. Write.

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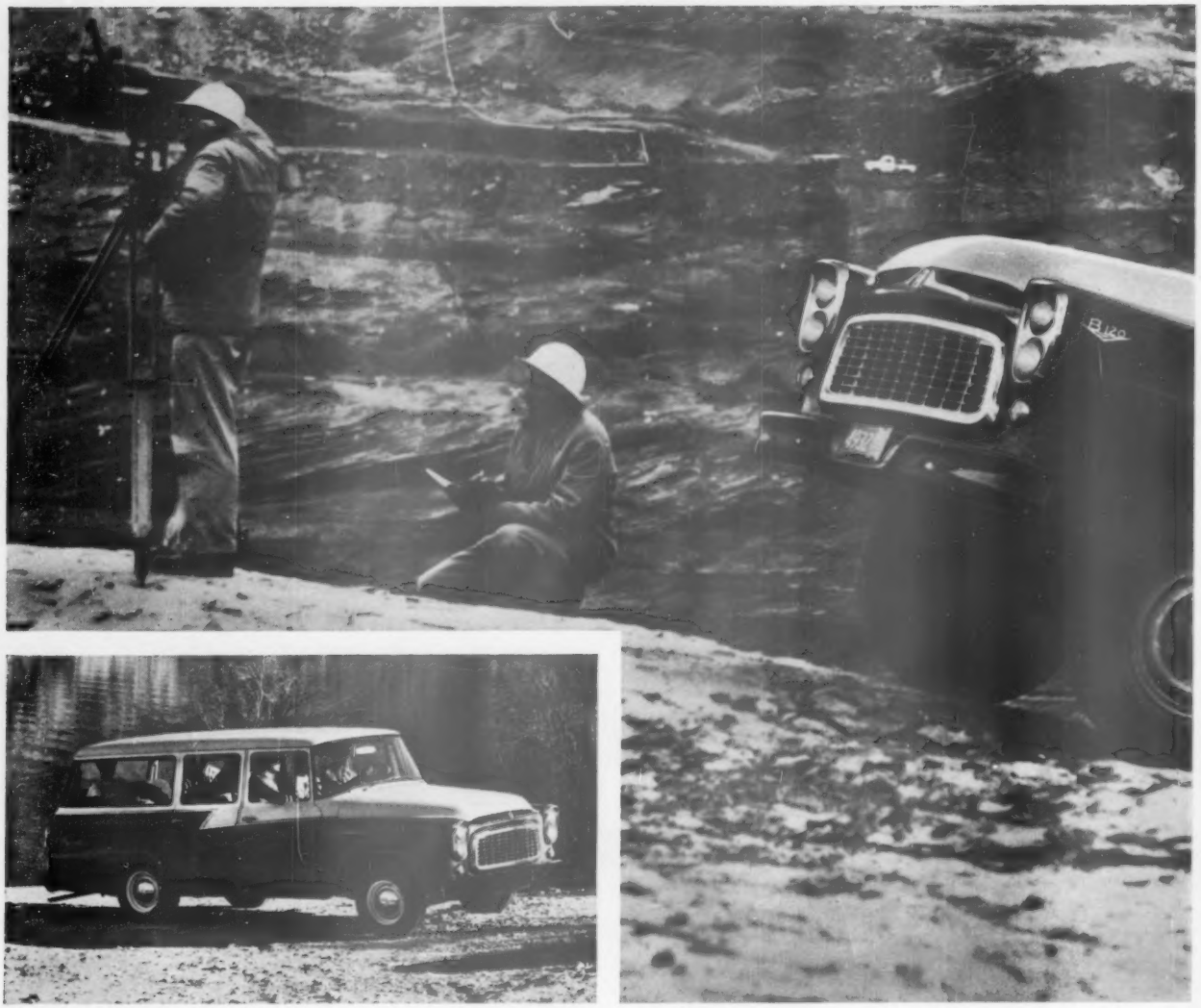

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This INTERNATIONAL vehicle gives your operation versatility, power and roominess—from exploration site to rig to pipeline

TRAVELALL has capacity, comfort and convenience! Seven different chassis to meet your every working requirement—with capacities from half-ton to more than a ton. *Every* model seats 8 big men comfortably. With one rear seat removed, there's still room for 5 men, plus good loadspace. With both rear seats removed, the Travelall carries 3 men and offers a big 147 cu. ft. of cargo area. Panel-type doors available for easier loading. Third curbside door gives access to seats and load.

TRAVELALL has power! 266 cu. in. INTERNATIONAL V-8 engine is standard. Fast-accelerating and quiet, it supplies abundant power from non-premium gasoline. Sturdy, true-truck design assures longer life and low maintenance cost along with amazing gas mileage. Famous INTERNATIONAL "sixes" of 240 or 264 cu. in. displacement are optional.

TRAVELALL has this to offer: Today's most practical all-purpose vehicle with strength to handle heavier loads.

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TRAVELALL has the best design! Ample ground clearance and favorable angle of approach, plus exceptional spring capacity and other chassis components, give you a superior personnel or load-carrier under all road conditions. Low, flat and full-opening tailgate make for easiest loading and unloading.

TRAVELALL has traction! Across the roughest terrain, Travelall four-wheel-drive models "dig in" to do the job quickly and easily. They can transport crews and loads to places ordinary "wagons" can't reach.

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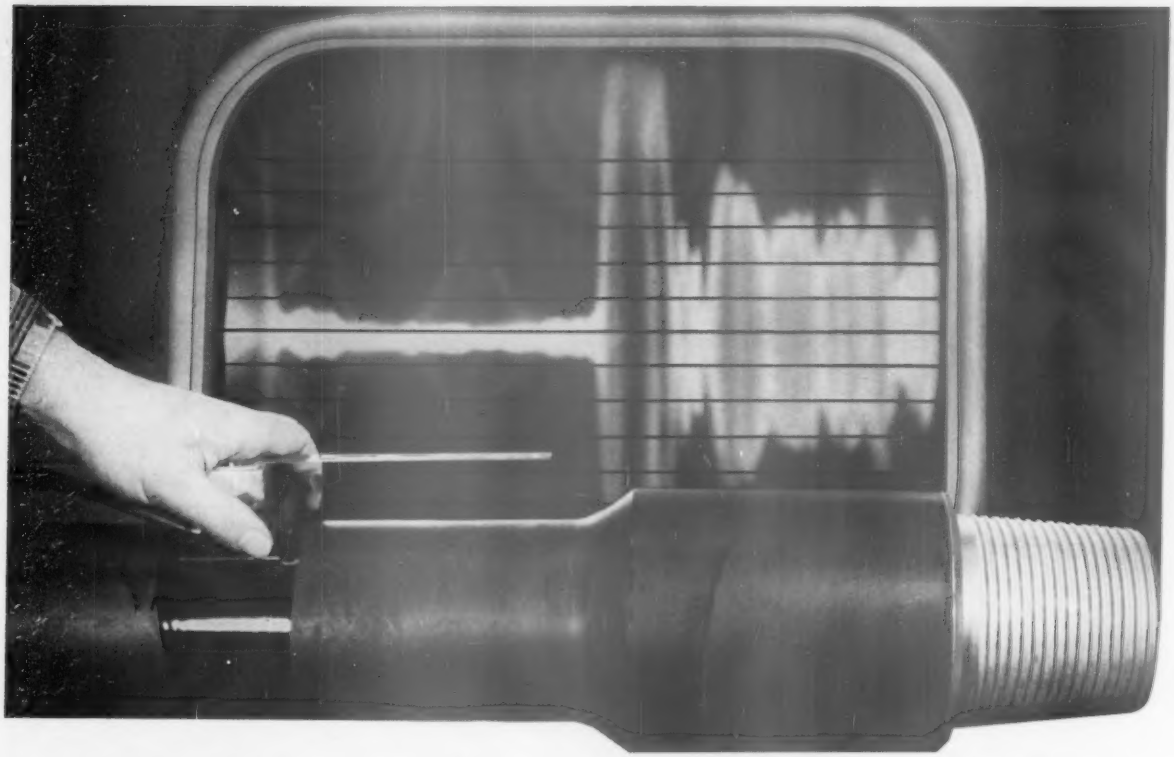

assures maximum performance for

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Flash Welded Tool Joints!

One of the newest innovations in non-destructive testing apparatus . . . the reflectoscope . . . is used by American Iron to inspect the weld zone for inclusions or defects.

The inspector slowly rotates pipe while holding a high frequency crystal to the exterior. This allows the emitted signal to enter the pipe. The signal bounces off the I.D. at an angle, and returns to the O.D. and then back to the I.D., eventually passing through the weld zone.

If any inclusions or defects are present the return signal will be shown on the screen. The joint is then removed and another joint is welded on.

This electronic check on the weld zone assures maximum performance for American Iron Flash Welded tool joints. Another reason why you buy QUALITY when you specify AMERICAN IRON.

Specify Flash Welded OPEN-HOLE Tool Joints for your Lightweight Drill Pipe.

Available Through Your Supply Store

▶▶▶ Equipment Men Notes

C. F. Gallagher named manager

C. F. Gallagher

. . . of the North Louisiana division for Schlumberger Well Surveying Corp., with headquarters in Shreveport.

After joining the firm in 1946 as an engineer trainee at Long Beach, Gallagher was promoted to field engineer in 1948. He subsequently has held positions of location manager at Coalinga and Bakersfield, Calif., and Pacific Coast division manager at Los Angeles.

Other changes announced by Schlumberger include: F. D. Whitman, general field engineer at Wharton, Tex., promoted to sales engineer at that location; C. G. Giffin, sales engineer at the North Louisiana division, transferred to Columbia, Miss., and promoted to location manager; L. V. Turner, general field engineer at Mount Carmel, Ill., promoted to sales engineer.

D. D. Fitzgerald, field engineer-special services in the Gulf Coast division, has been transferred to Houston as a sales engineer; H. C. Robinson, former sales engineer at Houston, has been reassigned to Beaumont and promoted to location manager; G. M. Lehnertz, sales engineer at the Tyler location, has been promoted to senior sales engineer; J. A. Gilreath, senior sales engineer for the North Louisiana division, has been transferred to the South Louisiana division at New Orleans.

W. C. (Red) Rye is promoted

W. C. Rye

. . . to regional manager of the Texas Gulf Coast of Magnet Cove Barium Corp., announces Frank Loe, vice president-coordinator of sales. Rye fills the position vacated by C. H. Sydow, Jr., who has accepted the newly created post of assistant to the president of Kaffie Lumber Co., a Magcobar dealer in South Texas.

Rye's 13 years with Magcobar started at Lake Charles, La., as a sales and service engineer in 1947. He previously worked 4 years in petroleum production and marketing.

Udell, Inc. establishes sales

. . . headquarters in Houston at 5117 Gulfton Street. A new manufacturing plant and headquarters offices are now under construction at Longview, Tex., and will be occupied later this year when these facilities are moved from Houston.

In addition to the sales headquarters, equipment servicing facilities will be retained at the same location in Houston to serve the Gulf Coast area. Sales engineers Frank Richards and J. M. Jackson will operate out of the Houston headquarters.

James M. McFadden is named

J. M. McFadden

. . . general manager of Fluid Packed Pump Co., division of National Supply Co. He succeeds Sidney A. Shuman, who has been transferred to Pittsburgh as assistant to the president of National Supply. McFadden started with Axelson Mfg. Co. in 1937 as a field store serviceman, working on oil well pumps, and later was promoted to Axelson's accounting department. He joined Fluid Pack Pump as treasurer and controller in 1953. The Los Nietos, Calif., firm was purchased by National last year.

Core Laboratories announces

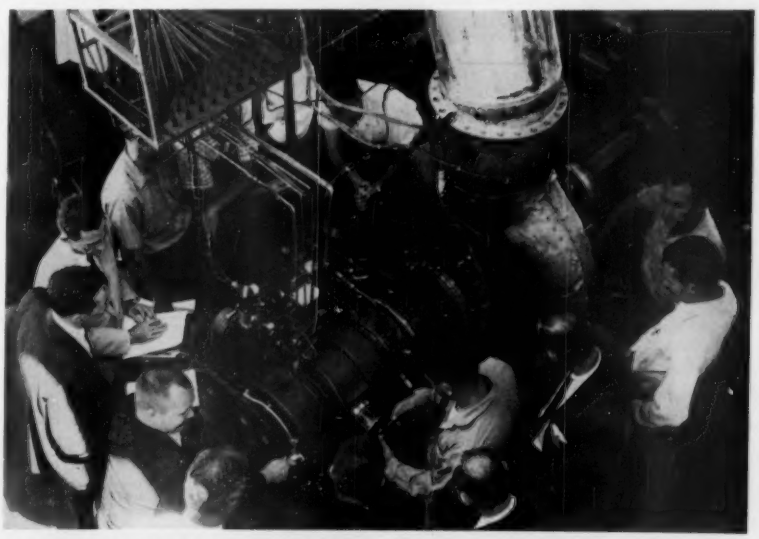
. . . the promotion and transfer of Frank O. Reudelhuber from Dallas to Paris, France, where he is serving as manager of the firm's newly formed subsidiary, Francorelab.

A former employe of Atlantic Refining Co., Reudelhuber joined Core Lab in 1951 and has held positions as manager of the firm's reservoir-fluid department, district manager of the Houston area field and lab operations, and senior engineer in the reservoir engineering and consulting department.

Jones & Laughlin Supply names

. . . two to new posts at El Dorado, Kans. H. D. Witt, store manager at El Dorado, takes on a salesman's role there, and T. D. Bruce, former storeman at El Dorado, will fill Witt's previous post as store manager.

Witt joined J&L as a storeman at Perry, Okla., in 1944. He was promoted to store manager at Crescent, Okla., in 1947 and later held the same job at Winfield, Kans. Bruce was first employed by the division as a storeman at McPherson, Kans., in 1954. He was transferred to El Dorado last year.



SATURN 1,100-HP. GAS-TURBINE ENGINE is the center of attraction as representatives of seven petroleum and natural-gas companies met recently at Solar Aircraft Co., San Diego, for a familiarization course on the industrial gas-turbine engine. The course was the result of increased use of gas turbines by industries for a variety of prime-mover applications. It has been designed to familiarize technical and management personnel with gas-turbine engines from theory to operation.

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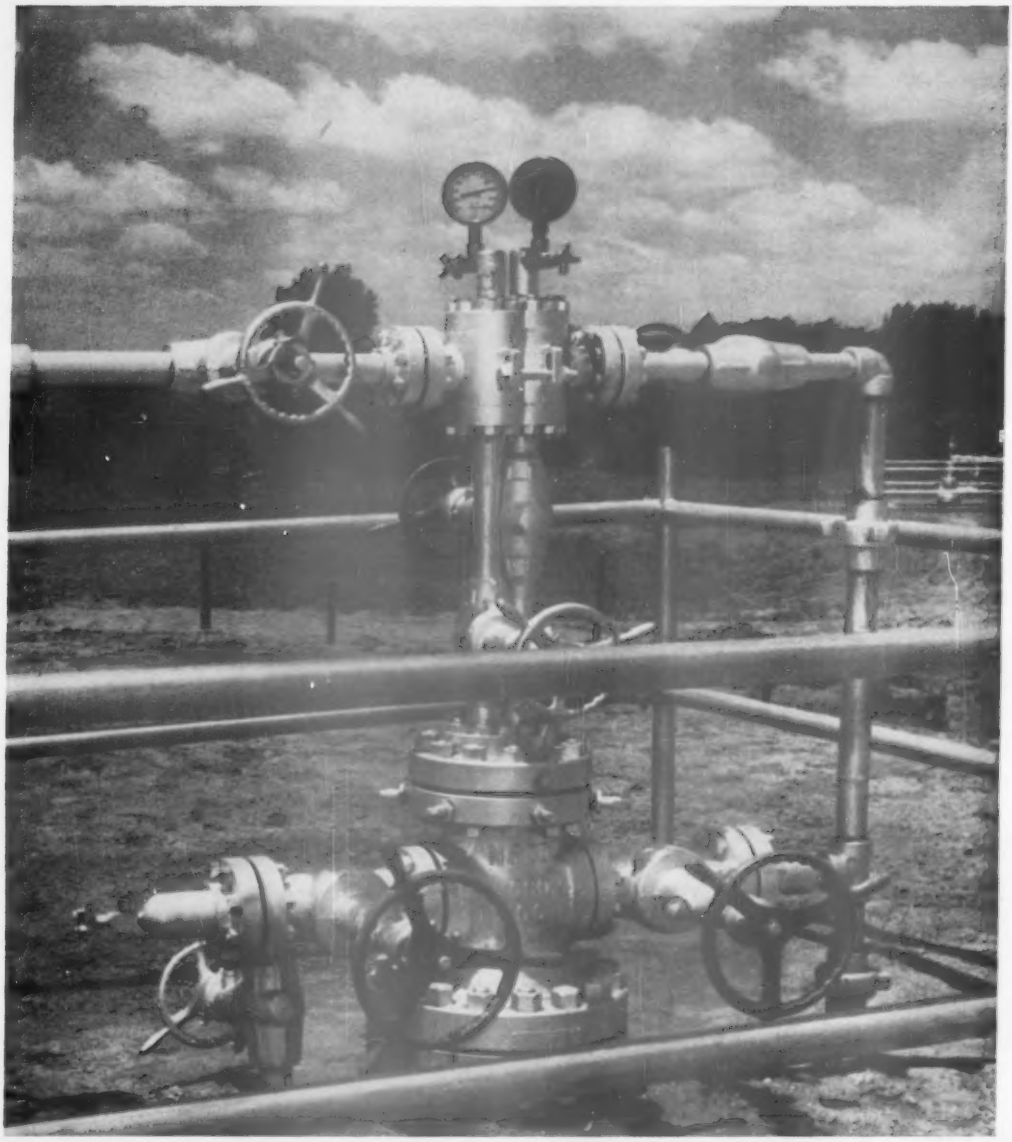
You will profit by talking to an **ORBIT** representative or to your favorite well head manufacturer about Orbit Valves for dual hookups

Orbit Valves are available also for Triple Hookups—working pressures up to 3000 lbs.



ORBIT VALVE COMPANY

BOX 699 / TULSA, OKLAHOMA / U. S. A.

Continental-Emsco Co. adds

. . . pump shops in Countyline, Okla., and Henderson, Ky. Both shops are completely stocked with new D+B pumps and parts for repairing all types of bottom-hole pumps. Field service is also available.

B. D. Adams has been named pump-shop foreman at Countyline, and W. M. Golden is the D+B production-equipment specialist. Foreman at Henderson is Claude E. Siner, and the district D+B production-equipment specialist is B. J. Peery.

National Geophysical acquires

. . . Electro Plastics Corp., also of Dallas, which will be operated as a division of National under the direction of Joe Baxt.

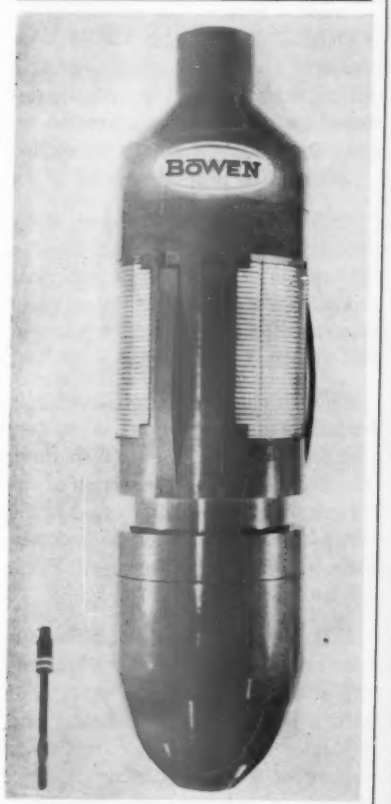
Founded in 1957, Electro Plastics was the first company in the southwest to do integrated plastic molding and fabrication, and the first firm south of Chicago to have its own vacuum forming and pressure-forming equipment. The corporation also produces a wide variety of point-of-purchase products, transparent packaging, premium items, light diffusers, industrial and commercial molded components, special plastic shapes and forms, sheet materials, and electronic sealing products.

The company's entire personnel contingent is being retained under the supervision of Manufacturing Vice President Wayland M. George, with the firm since 1957. Two additional vice presidents named with the merger are John A. Gillin and Walter R. Mitchell. Joe L. Vaughan was named secretary and treasurer.

Stewart & Stevenson makes

. . . a series of promotions and transfers. Joe Manning, former vice president and general manager, has been named executive vice president. Charles Ward, who had been acting as assistant general manager, has assumed the post of general manager. Dick Conolly, former South Texas district manager, has been named coordinator of branches. His office will remain in Corpus Christi.

The San Juan branch, formerly operating as an offshoot of the Corpus



RELEASING SPEAR shipped to Iraq by Bowen Itco, Inc., may be the largest releasing spear ever manufactured. It's a 20-in. spear designed to retrieve 20-in. 96-lb. casing. By contrast, the small Bowen releasing spear (shown at left in photo), is designed to retrieve 1.05-in. tubing.

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NOW SPECIFIC GRAVITY RECORDING OF LIQUIDS AT ANY DISTANCE
RECORDING TRANSMITTER
Accurate long-distance transmission of specific gravity recordings is no longer a problem with any of the new RMT Models of Arcco-Anubis Recording Gravitometers for recording and transmitting liquid gravity records. These instruments combine the mechanism of the standard Arcco Liquid Gravitometer with a metameter telemeter transmission system which records and transmits the specific gravity record to control room or other remote location. The interconnecting line may be any two-wire electrical circuit or its equivalent: private wires, telephone circuits, carrier current channels, or radio (VHF or UHF).
The range of the standard instrument is .15 or larger, but instruments with ranges of .10 or .05 can be supplied. Charts are available for more than 75 different ranges of Specific Gravity or Degree A.P.I. Special ranges can be furnished at slight additional cost. Request Bulletin No. 111-R3 for complete details.
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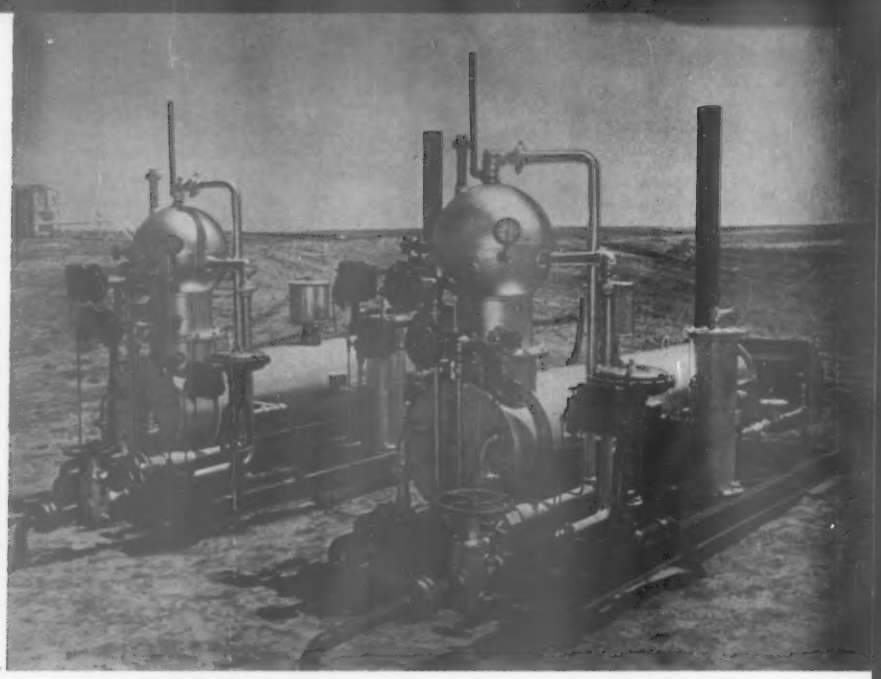
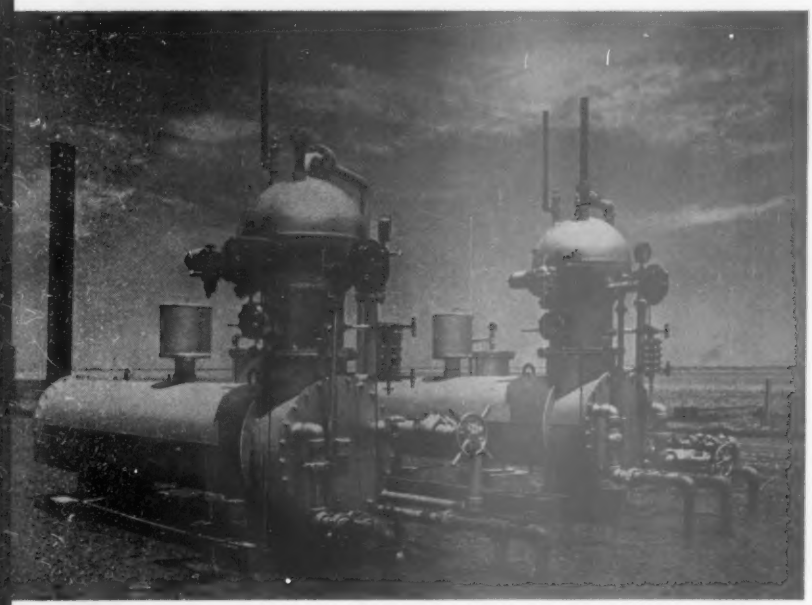
MANUFACTURERS OF PRECISION INSTRUMENTS
Send for Bulletin 111-R3

These two BS&B FREE-O-FREEZ Units are typical of many going into cold weather areas.



The Economy Package...

For Freedom From Freeze-Ups!



FREE-O-FREEZ by BS&B is a packaged Heater-Separator requiring minimum hookup and specifically designed for cold weather operation . . . gives dependable, trouble-free service . . . even in the dead of winter!

FREE-O-FREEZ is a neat, compact, integrated unit . . . combines the field-proved advantages of spherical separation and indirect heating to provide efficient water-oil separation and release of solution gas.

Prior to choking, the wellstream is heated in the heater flow coil to prevent freeze-up and hydrate formation. The water-oil separator section of the spherical separator is immersed in the water bath of the heater where it absorbs heat to prevent freeze-up. Flash arrestors are provided for safety.

FREE-O-FREEZ is available in a wide range of heater sizes, coil ratings and spherical separator sizes . . . and with a large selection of heater and separator accessories . . . to satisfy a variety of lease conditions. Simple, rugged and accurate controls are used.

A call to your BS&B Man will bring you detailed information on the unit best suited to your requirements. Or, you may write to . . .

BS&B

BLACK, SIVALLS & BRYSON, INC.

DEPT. 1-A6

P. O. BOX 1714, OKLAHOMA CITY

branch, now functions as a full branch operation under the responsibility of Dick Grant. Tom Langham has been moved from credit manager to assistant to the general manager with offices in Houston. Dick Anderson, formerly associated with C.I.T. Corp., is now credit manager. N. N. Elkins, previously sales manager at the Corpus branch, is now branch manager there.

The Beaumont operation, which has operated under the Houston offices, has assumed a full branch status. Howard Perkins is branch manager. L. D. Howell, Houston service manager, has been transferred to the Houston sales department. He is assigned to the petroleum-industry sales division. Harold Vaughan is now service manager.

Marvin Reichle is appointed

Marvin Reichle

. . . assistant salesman for all divisions of Plastic Applicators, Inc., reports Cordell Garner, vice president in charge of sales. Besides the parent company, Reichle will also be concerned with Rubber Applicators, Pipe Inspectors, and the sales territories served by these firms. Reichle was previously sales manager for Rubber Applicators.

E. S. Turner appointed

E. S. Turner

. . . Northwest regional marketing manager for Southwestern Industrial Electronics Co., a division of Dresser Industries, Inc.

In making the announcement R. O. Vaughan, vice president, marketing, said that Turner's regional office will be in Colorado Springs, Colo. Before joining SIE, Turner served as district manager in the same area for Stromberg-Carlson Co.

Homco service branch is opened

. . . in Ruston, La., according to C. L. Roach, vice president of domestic operations. The store, equipped to furnish complete fishing and cutting, directional drilling, electrical well services, and oil-field rentals, is managed by Warren Magee. L. B. Dennig has been named district fishing and cutting representative. Carrol L. Cole is electrical-well service supervisor, and W. W. Parks is warehouseman.

V. C. Mickle joins

. . . the sales staff of George E. Failing Co., Enid, Okla., manufacturers of portable rotary rigs. Mickle formerly worked for Failing between 1947 and 1957 as manager of the water-well division.

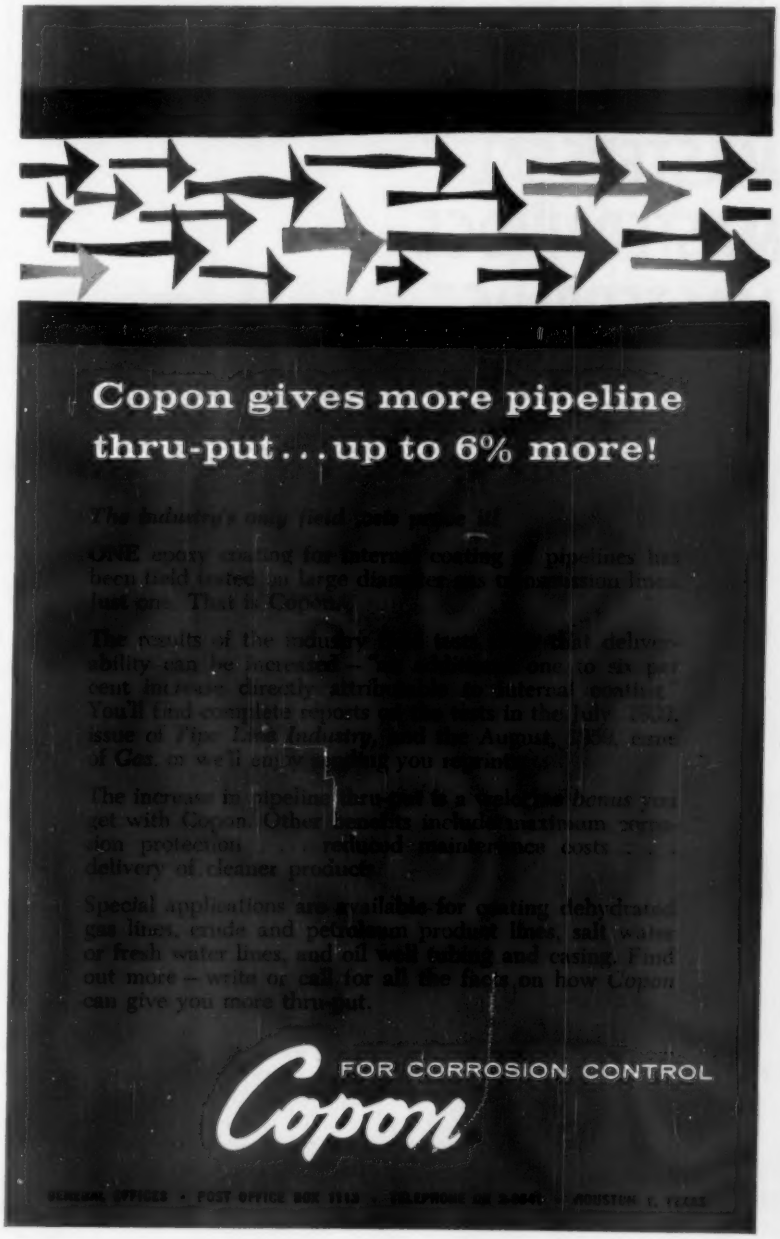
Craig M. Rowley elected prexy

. . . of Parkersburg-Aetna Corp., following the elevation of Bernard P. McDonough to the post of chairman of the board of directors. McDonough continues as chief executive officer.

Rowley formerly was a vice president of the corporation and president of the Parkersburg Rig & Reel Co. division. He joined the company in 1957. Prior to that, Rowley spent 7 years with Sinclair Oil Corp., five of which were in Venezuela where he was chief petroleum engineer.

R. J. Howenstine is manager

. . . of the San Antonio oil-field-equipment sales office of Delta Tank Mfg. Co., Inc., reports Ross B. Baze, vice president. Howenstine has been in sales of petroleum and other allied equipment since 1952.



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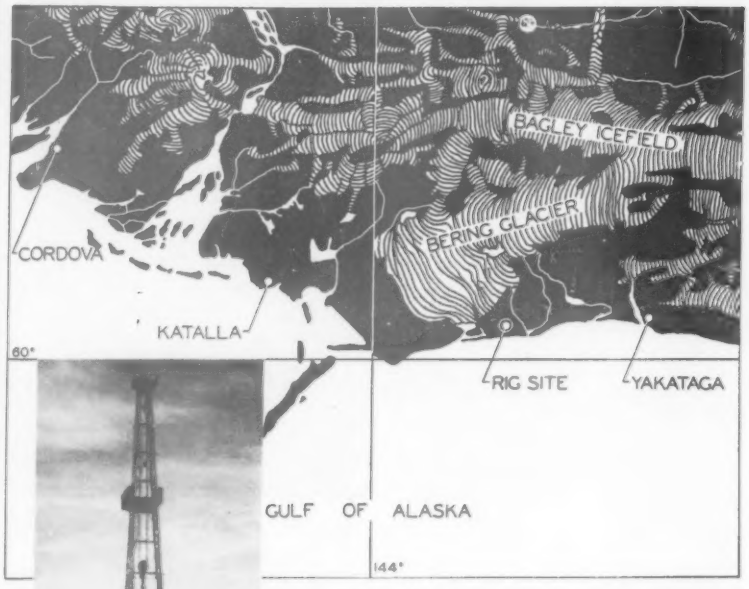

THIS is where Richfield Oil Corp. is drilling the 1 Kaliakh in a little-explored area of Alaska. Contractor is Clyde Hall Drilling Co. of Bakersfield, Calif. The National 110 rig is shown at left.

Drilling a really remote well

requires lots of planning

IT TAKES a lot of planning to drill in remote country. Here's an example of an operation in an out-of-the-way site in Alaska where the drill site is 100 air miles from the nearest city, Cordova. Surrounded by mountains, glaciers, and sea, Clyde Hall Drilling Co. of Bakersfield, Calif., is drilling the Richfield Oil Corp. 1 Kaliakh in the Katalla-Yakataga basin.

Although close to the sea, the location is not considered readily accessible by any standards. The climate offers some deterrent aspects; annual rainfall is 180 in. a year, and during some seasons there are only 2½ hours of daylight.

The rig has been modified to cope with the elements. Partially enclosed to protect the crews against high, frigid winds, the drill also has a crew-house nearby for emergency use. All supplies are flown in, including the essential commodities of fuel and food which is a large portion of the frequent shipments.

The legal description is SW¼ 34-20s-14e, CRM. Drill site is 2 miles inland from the Gulf of Alaska and 5 miles from the face of the Bering Glacier.

The well was spudded December 3, 1959, following 5 months of preparation and an expenditure of 1½ million dollars. Rains caused a 2½-month delay in the project. The rig and special equipment associated with it were brought by boat 3,500 miles from Los Angeles. This move from Los Angeles to Yakataga Bay was made in two LSM's and an LST. On the last leg, the LSM's carried the loads the remaining distance to the settlement of Yakataga.

It was necessary to build a road 23 miles from Yakataga to the drill site. Most of the road is built on muskeg which is solid only when frozen. Trees pushed aside by bulldozers continue to grow in the marshlike ooze. Much of the gravel used in building the road sank below surface into the muskeg.

Type rig. The drilling rig used is a National 110 powered by three Waukesha VLRDBU diesel engines with

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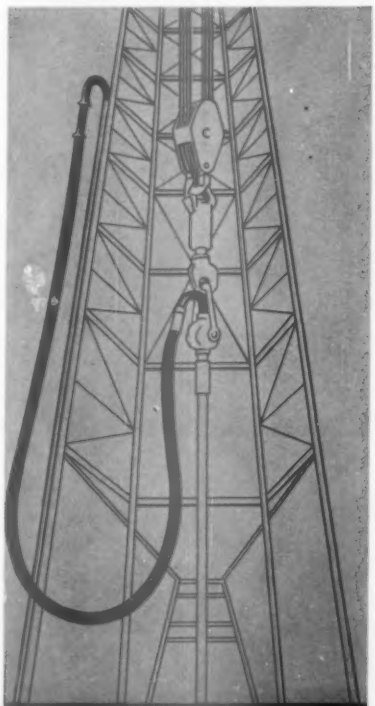
tool pushers agree . . . .

"NO KNOTS IN REPUBLIC HOSE!"

Equal tension on each steel cable prevents knots.



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DIVISION LEE RUBBER & TIRE CORP.
YOUNGSTOWN 1, OHIO
For information on Rotary, Mud Pump Suction or Vibrator Hose, write to: Republic at Youngstown or check your local J & L Supply Store.

a 142-ft. L. C. Moore mast. It was rigged up and tested at Bakersfield, Calif., before loading aboard the boats. Rigup in Alaska was completed in a week.

The whole unit, including mud tanks and pump manifolding, is located in a compact area, 50 by 100 ft., and is enclosed on all four sides with specially designed steel panels for weather protection.

Rig equipment includes a type MS-27½ rotary, a three-section drive group, a G-1000 B and a C-350 slush pump, an N-815 swivel, a 548-F-300 hook block, a 5¼ by 40-in. kelly, a type "AS" roller kelly bushing, and a type "D" wire-line anchor, all by National Supply, and a Martin-Decker type "D" weight indicator.

The engines and drive group are equipped with National 270 hydraulic couplings, which because of their scoop control serve as engine clutches. A National auxiliary draw-works drive, sometimes known as "the run-around," and a National No. 6 Micromatic drilling control, provide additional efficiency and ease in operating the rig.

Careful selection of equipment was essential, because during the winter, when storms close the shore for water transportation, all needed supplies must be flown in from Cordova where the harbor facilities can be used all year. The population of Yakataga consists of five families, who keep the air strip open.

All fuel oil for the rig is flown in a C-47 tanker plane, with a capacity of 2,000 gal. Temporarily pumped into a rubber storage bag, with a capacity of 10,000 gal., located near the runway, the oil is trucked to steel tanks and another rubber storage bag at the rig site. Normally, the rig uses about 1,000 gal. of fuel a day.

The camp is about a mile from the air strip. Wooden trailer houses provide accommodations for eight men each and, in addition, the camp includes a recreation hall, dining room, kitchen, and a room equipped with washing machines and driers.

At times, more than 50 men are located here. In addition to Clyde Hall employes, these include representatives of supply and service companies.

For self-sufficiency, a cementing unit, mud-logging unit, and surveying unit are kept at the location. When required, additional service-company personnel for operation of these units are flown in from Anchorage.

At last report, the 1 Kaliakh had reached 14,699 ft. and the well was being tested at selected intervals. Upon completion or abandonment of this well, Richfield plans to drill a second well.

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ELIMINATES . . .
Cement Channeling
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An installation — from the equipment shown — is your best insurance *For a Good Cement Job.*

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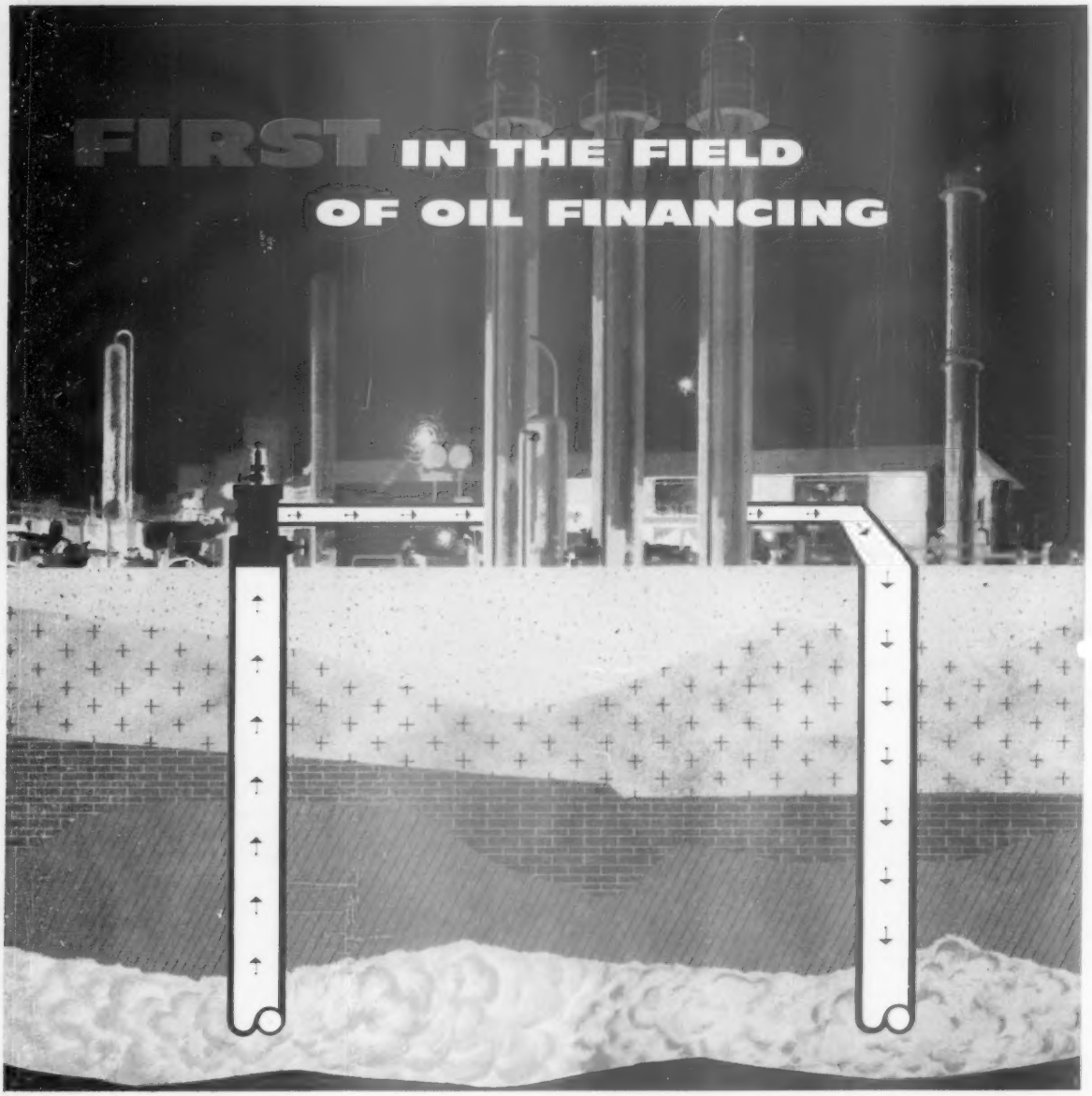

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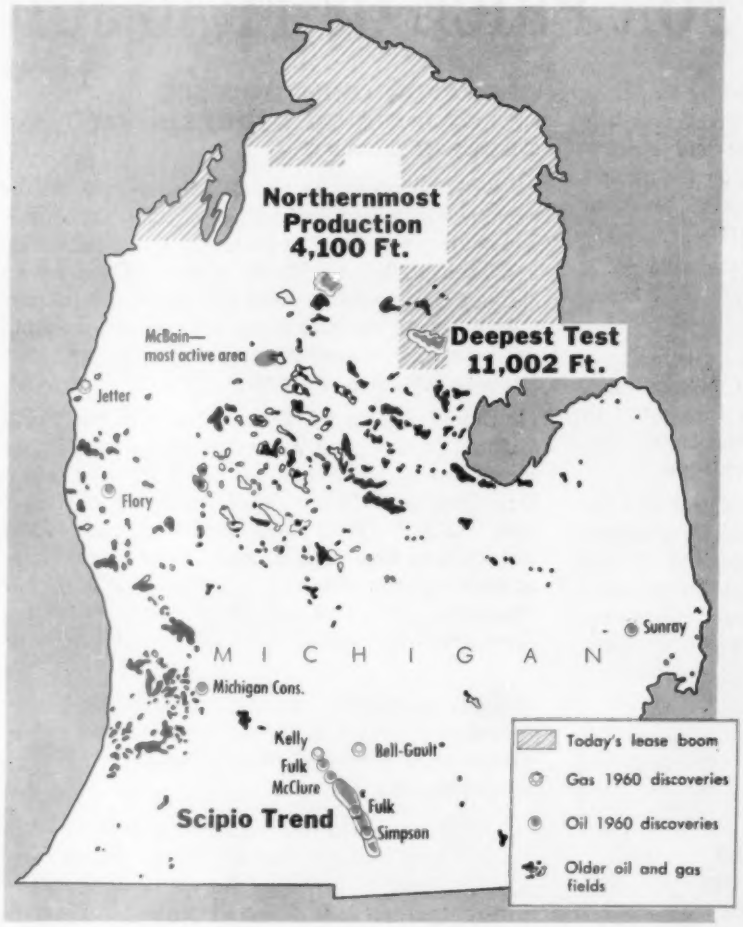

INTEREST IS FANNING OUT to all parts of Michigan, following the sensational Scipio play in the south, and new discoveries on both the eastern and western rims of the Michigan basin. Biggest news of the year was whopping success of a recent auction of state leases in extreme northern counties (shaded on map).

Michigan's far north draws 43 eager bidders

BY FRANK J. GARDNER

UP IN MICHIGAN, things get busier every day. Not since the peak drilling and production year of 1939 have so many operators been interested and active in the state. And that interest fans out over the entire Lower Peninsula . . . south, east, west, and north.

A spring sale . . . Observers blinked their eyes a couple of weeks ago, when a Michigan state lease auction on lands lying in the 14 northernmost counties drew bids averaging $1.69 per acre on 83,783 acres out of the 101,256 that were offered. It was the third-largest sale on record, and biggest since 1950. Prior to the sale, a 4-month-old lease play had been quietly sweeping across privately owned lands in the same counties; estimates place the acreage involved on fee lands at 650,000 acres.

At the state sale, interest was hottest in Leelanau, Charlevoix, Emmett, Cheboygan, Presque Isle, Montmorency, Alpena, Ogemaw, Alcona, Iosco, and Oscoda counties. Forty-three companies made bids, and the sale had to be extended into its second day to accommodate them. About half of northern Michigan is state-owned.

Climaxes a rush . . . Why all this interest in areas far north of any commercial production or drilling activity? There are several possible reasons, but probably the most compelling is the "me-too" bug. Latecomers to Michigan have missed the payoff of the past 2 years in the southern counties; and they're now convinced that the state offers lots of prospects not suspected earlier. Too, large blocks are available in the north, at reasonable prices. So the 4-month-old rush to Michigan has seen more and more out-of-state operators bypass the southern fields and skip right up the Big Mac bridge.

There are geologic reasons behind the play as well. Some companies believe that lessons learned in exploring the Scipio trend for Trenton-Ordovician oil might be applied on the northern, eastern, and western rims of the Michigan basin. Several geophysical parties (gravity crews) are known to have been exploring all parts of Michigan looking for "zones of weakness" that could lead to localized fractured-dolomite reservoirs like those of Scipio.

Chief targets of the drill will probably be oil in the Trenton and gas in the Silurian Niagaran and Salina. Dundee-Devonian rocks comprise another possible reservoir. Records show that in two of the northernmost counties, Cheboygan and Charlevoix, the Dundee lies at about 1,100 ft., the Niagaran at 3,300 to 4,175 ft., and Trenton at 4,400 ft. or deeper.

And a rewarding year . . . Michigan has had a fairly successful exploratory year so far, with at least 10 new fields and extensions on the books (see map). Most of these have centered on the Scipio trend, but important Niagaran reef strikes have occurred in St. Clair County on the east and in the Traverse-Devonian on the west.

Newest of the Traverse discoveries is Flory Drilling Co.'s 1 Baron, Section 21-14n-16w, Oceana County; here, a 125-165-bbl. oil well has been finished at 1,950 ft., and five new locations have been staked. Michigan observers call it the best shallow strike in more than a year. Success of this wildcat is believed to have influenced the prices paid at the state sale, which occurred only 2 days after the discovery.

DOWELL CUSTOMER GETS

"NEW" WELL FOR PRICE OF FRAC JOB

Engineered fracturing—as practiced by Dowell—can do many things for producers. Treatments can increase production, reduce workover and production costs, improve gas/oil or water/oil ratios, and increase recoverable reserves. Fracturing has even saved valuable wells from abandonment.

A Texas Panhandle producer feels like he got a "new" well for the price of a frac job . . . here's how it happened:

Production had declined to 11 bopd—pumping—from an old well completed into the Cleveland sand. Completion was through perforations from 6420 to 6458 feet. Workover was considered because new offset wells tested 400 bopd on completion.

Dowell engineered a fracturing treatment with the "Frac Guide"*. Waterfrac was selected for efficiency and low cost. 40,000 gallons gelled water and 105,000 pounds sand were used. 70 gallons of Freflo* were used to prevent emulsions, and 100 ball sealers were used to divert part of the treatment into less permeable zones. Injection rate was 65 bpm at 900 to 1400 psi down seven-inch casing.

Following treatment, *production stabilized at 105 bopd flowing.* Payout time for fracture treatment was four months.

DOWELL FRACTURING AND ABRASIJET HELP GET GOOD PRODUCTION FROM "PROBLEM" FIELD

Wells in the Langlie Mattix field of Lea County, New Mexico, are hard to produce. The oil pay of the Seven Rivers formation is tightly sandwiched between water below and gas above. It will not produce satisfactorily without stimulation—yet fracturing usually results in water or gas rather than oil.

Dowell engineers suggested a two-stage treatment that is working extremely well. First, Abrasijet* is used. The jetting tool is set in the middle of the oil zone at about 3585 feet, and the walls of the open hole are jetted with oil and sand. This produces considerable enlargement of the well bore.

Then wells are fractured, using 10,000 gallons lease crude and 10,000 pounds sand. This relatively small treatment is designed to provide the needed stimulation without breaking through to either gas or water.

Success has been outstanding. *The first fifteen wells treated are all producing their allowables; only two are producing appreciable water and none have broken through to gas.*

OPERATOR USES DOWELL FRACTURING TO STRETCH OUT DECLINE CURVE

Wells completed in the 'D' sand of the Southwestern Wayne pool in McClain County, Oklahoma, had not responded well to fracturing. Usual treatments had been 10,000 to 20,000 gallons of refined oil carrying one pound of sand per gallon. Initial production would be satisfactory but production would decline rapidly—frequently approaching pre-treatment levels in less than a month.

Dowell engineered a treatment with the "Frac Guide". Petrojel* was recommended for a well completed through perforations from 6977 to 6994 and from 7062 to 7076 feet. 20,000 gallons gelled crude with F.L.A.* (Fluid Loss Additive) and 46,000 pounds sand were used. 25 ball sealers were injected at mid-treatment. Injection rate was 21 bpm. *Before treatment, production was 10 bopd. Three months later, production had STABILIZED at 30 bopd.*

GOOD GAS/OIL RATIO RESULTS WHEN KANSAS OPERATOR USES DOWELL FRACTURING AND ABRASIJET

Wells completed into the Mississippi Chat of the Spivey-Grabs pool in Harper County, Kansas, have a GOR limit of 3000/1. An operator wanted to fracture to improve production—yet not break through to gas. Abrasijet was used to perforate casing at 4464 feet. Then, following treatment with 500 gallons Mud Acid, well swabbed 12 barrels of oil in seven hours.

After fracturing with water and 3500 pounds sand the well *flowed* 10 boph on a ¼"-choke. *Gas/oil ratio was only 1323/1—exceptionally good for the field.*

Your Dowell engineer can help you select a treatment to solve your well problem. Call him for further information or service. Dowell services and products are offered from more than 150 offices and stations in the United States, Canada, Argentina, and Venezuela. Dowell, Tulsa 1, Oklahoma.

*Dowell Trademark

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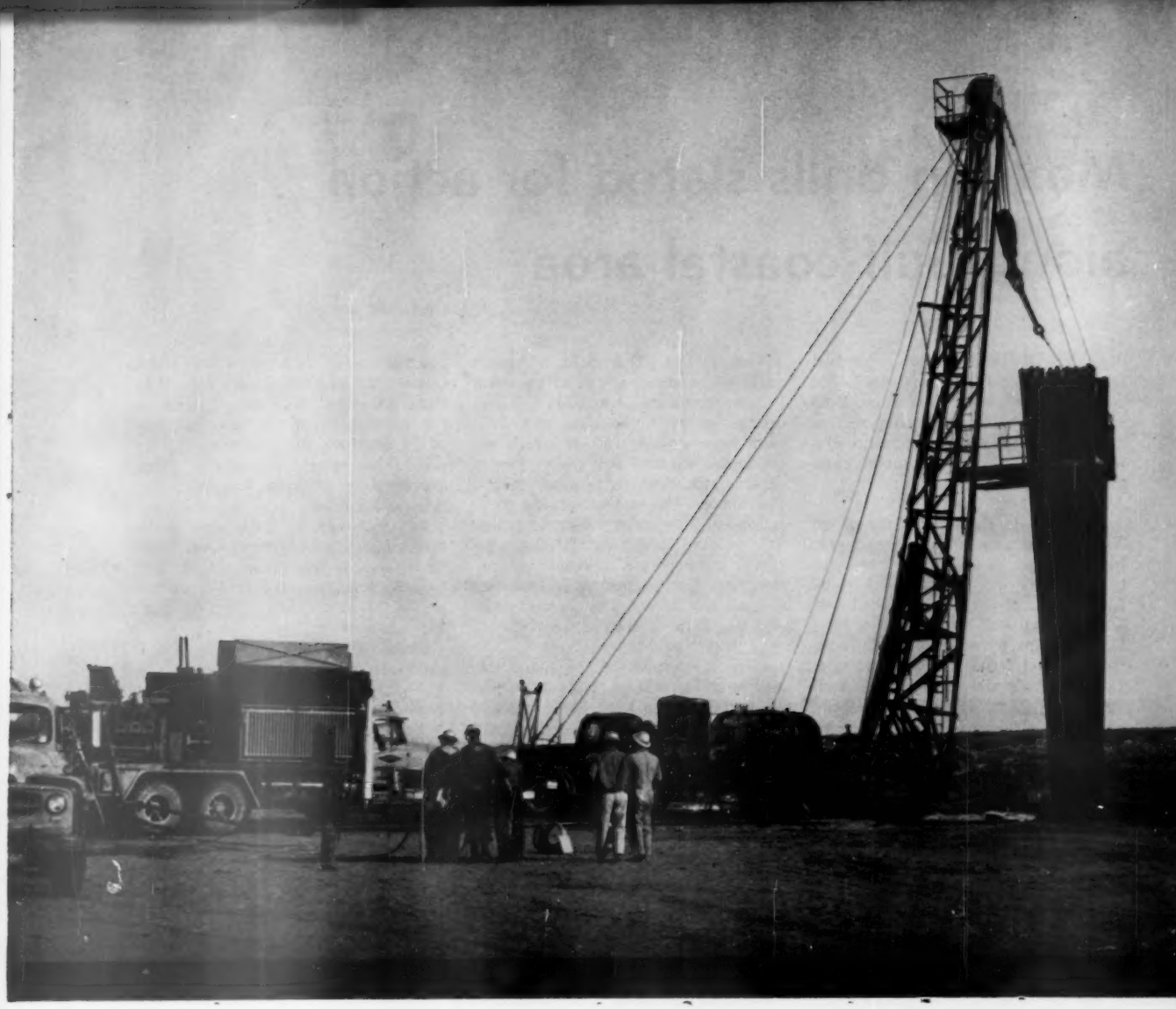
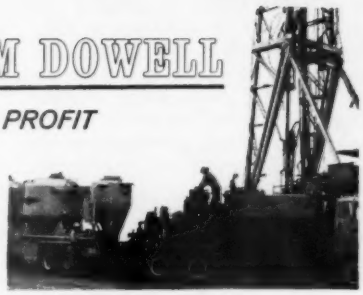
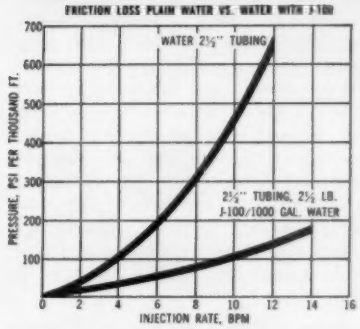


NEW IDEAS FROM DOWELL

TO HELP YOU MAKE MORE PROFIT





ROCKSHOCK*

This new Dowell service employs glass *implosion* capsules to clean formations or reduce breakdown pressures ahead of fracturing or acidizing treatments. Hydrostatic pressure is used to break the capsules. This action releases powerful pressure waves—to remove scale and other deposits, break emulsion blocks, and to initiate fractures.

FLAC*

This new fluid loss control additive for cement is a major breakthrough in both squeeze and casing cementing techniques. It cuts fluid loss to almost any desired extent without affecting other characteristics excessively. Supplies are limited at present, but operators are invited to familiarize themselves with FLAC so it may be used when it becomes more available.

SLICK WATER (J-100)

This is Dowell's new, improved thickening and friction reducing agent for fresh water. It effectively improves the sand-suspending qualities of water. More important, however, is its ability to reduce friction losses and pump requirements by more than one-half as shown on the graph. The result can be better fracturing at lower cost.

Mexican drills slated for action along Gulf coastal area

A BUSY DRILLING year is planned for Mexico's Tampico-North Zone and in the South-Isthmus Zone. Both of these Mexican producing regions expect one of the most successful wildcatting and development campaigns yet.

Tampico. In the north zone of the Tampico district, 27 rigs are operating. Of these, 10 are working on wildcats and 17 on development wells. Last year 119 wells were drilled with a total footage of 750,000 ft. In 1960, Pemex plans to put down 220 wells with a total footage of 1,500,000 ft.

Drilling depths here range from 5,000 to 12,000 ft. to the Mesozoic and Upper Paleozoic formations. Average producing depth of wells in the region is 6,000 ft. Cumulative production in the Golden Lane fields is 1,-150,000,000 bbl. Of this, Panuco field has yielded 850 million barrels. Panuco, discovered in 1904, was the first producer in Mexico. Since discovery 6,000 wells have been completed in the field, of which 700 are now on production, making 150,000 bbl. per day.

Golden Lane. The Golden Lane fields form a crescent which onshore extends for about 60 miles in southern Tamaulipas State. Pemex has conducted some offshore exploration which shows that structurally the Golden Lane forms a circle—the crescent onshore is closed offshore under the waters of the Gulf of Mexico. However, these waters are deep and Pemex sees no immediate prospects for exploration offshore. The gently sloping continental shelf that is found off Louisiana and Texas is not present here.

Tamps field. This field, 15 miles north of Tampico, is one of the main Pemex producing areas today. It was opened in 1955. To date 169 wells have been drilled, 160 of which are producing 20,000 bbl. daily. Pemex expects this field to produce 50,000 bbl. daily. The extent of the field is expected to reach 1,000 acres and 1½ million acre-feet. Ultimate reserves are expected to reach 1½ billion barrels. Production is from the Upper and Lower Cretaceous rocks, and the Jurassic section.

Tres Hermanos. Pemex found that this field, like Tamps, is located parallel to the Golden Lane fields, but outside the Golden Lane crescent. Exploration work has indicated to Pemex they should find another Golden Lane along this trend.

Permeability in the Tampico area fields is low. They have to fracture and acidize producing wells. Under primary production methods, Tampico will produce about 5% of its in situ 1½-billion-barrel reserve. Pemex anticipates that water floods would raise the recovery to 40% and miscible-phase methods would recover 50%. At Tampal field, one seven-spot miscible flood is estimated to have 40,000,000 bbl. in place. Wells here are drilled on a 400-m. spacing.

In the Tampico area proper, Pemex feels it will have to double its production in 8 years. There are now 100 proven Jurassic locations waiting for the drill. Jurassic production is not defined on the north in Tampal field.

Poza Rica. This is one of the biggest oil fields in North America. The area was first explored about 1900, but it was not until 1924 that Eocene production was found near Poza Rica. Gravity surveys indicated a high over Poza Rica, and Well No. 2 came in for gas-condensate on the gas cap of the structure. Eight more wells were drilled by private companies. Since expropriation Pemex has extended this field 10-fold.

In 1948 seismic work was undertaken in the entire general area. These surveys, plus the gravity work previously done, resulted in the discovery of 27 new fields producing from the Tamabra limestone.

Poza Rica is a stratigraphic trap. It produces 30°-gravity oil versus the 16°-gravity oil found in the Golden Lane.

Pemex was the first discoverer of Jurassic oil in the San Andres field in 1956. Now 20% of the Poza Rica production comes from Jurassic limestone. Many of the fields in the Poza Rica region parallel the Golden Lane. Pemex expects to find more production southeast of San Andres. There are now 24 oil and gas fields in the district. They fall into three groups producing from the Tamabra lime, the Abra lime, and the Jurassic lime.

There are 37 rigs working throughout this area. Eleven of these are operated by contractors who plan to bring two more in soon. Nearly 1,000 wells have been drilled in the region. Pemex operates 13 workover rigs and 8 portable swabbing units.

Fields in the Poca Rica area fall generally into three groups.

1. Group 1 produces a fairly light oil (30°-31°). Producing formations have good porosity, but low to medium permeability. Poza Rica is the largest field in the area. It covers 32 sq. miles and comprises 450 wells varying from 2,200 to 2,800 m. in depth. It is still being developed on the southeast side. Recoverable reserves are estimated at 1,219 million barrels. Cumulative production has reached 762 million barrels. Production now averages 75,000 bbl. daily, equaling nearly half of the district's production.

2. Group 2 comprises limestone fields with low permeability and an average depth of about 2,100 m. This group encompases the fields of

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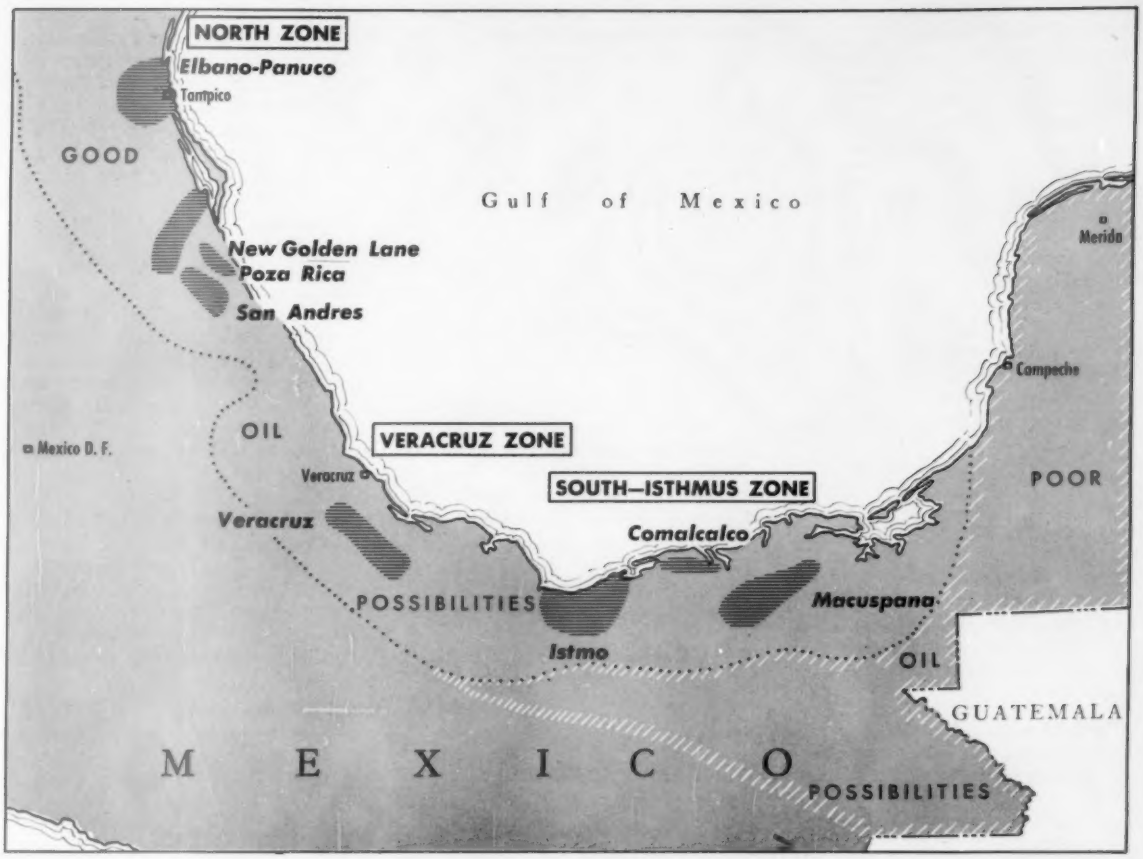


MEXICO'S COASTAL REGION hums with oil activity stretching from Tampico district's North Zone to Isthmus Zone on far southeast. Rich producing areas spot scene of growing wildcat and development play.

the old Golden Lane plus Pemex extensions. The group consists of a series of closed structures of Middle Cretaceous age with a 100%-effective water drive. The fields produce heavy oil at depths ranging from 2,360 ft. on the north to 7,600 ft. on the southeast. Pemex opened up its first extension of the old Golden Lane in 1952. Discovery and development of these new trend fields progressed rapidly.

3. Group 3 comprises the oolitic limestone production (Jurassic) of low permeability producing light 29°-gravity oil. The reservoirs have no gas cap, are undersaturated, and exist at high pressure. The San Andres field is the main producer of Group 3.

In addition to these three groups of fields, there are a few miscellaneous areas producing from the Eocene "dirty sand." These fields are small and isolated, showing very low permeability. Oil accumulation shows no apparent relation to structure.

Reserves. In the entire Poza Rica or Golden Lane area, proven recoverable reserves now stand at about 1.77 billion barrels. Cumulative production to date is about 1 billion barrels. Gas reserves are estimated at 2.78 trillion cubic feet. About 1,040 wells are now on production.

In Poza Rica proper, the bottomhole pressure has dropped to a point where artificial lift is required. Gas lift, rod pumping, Reda pumps, and hydraulic pumps are used.

Production. Poza Rica's output peaked in 1951. Pemex realized that they couldn't maintain production without secondary recovery, so the output was reduced considerably. About half the wells in the field are now on artificial lift—mainly gas lift.

There are 34 tank batteries, 25 pumping stations, and 11 central cooling systems in the field proper. The field is producing considerable water, and Pemex operates the largest gun barrels in the world.

Pemex has started water and gas injection in Poza Rica. Water is injected on the flanks of the structure and gas at the top. To date injection has reached 100 billion cubic feet of gas and 308 million barrels of water. Water injection rate is now 200,000 bbl. per day. No 5-spot patterns have been used.

San Andres field is also on secondary recovery. Gas injection began in 1959, and up to the first of March 1960, 890 M.M.c.f. had been injected. The gas-injection rate is now 25 M.M. c.f.d. This will be raised to 50 M.M. c.f.d. soon.

A pilot water flood was begun in March. This affected only one injection well taking 25 bbl. daily.

Pipelines-processing. The Poza Rica district comprises only one small topping plant making products for local consumption. This will be replaced by a new 15,000-bbl. topping plant this year. The rest of the output (140,000 bbl. daily) moves to Mexico City and Salamanca. Two oil pipelines, one gas line, and one propane line move production to the city.

The field has a large gas-processing plant which strips natural gasoline from 185 M.M.c.f.d. In addition, 150 M.M.c.f.d. of dry gas is processed for sulfur removal. The plant produces 2,300 bbl. daily of propane, 5,100

bbl. of natural gasoline, and 117 metric tons of sulfur daily.

In addition to the four pipelines to Mexico City, a third additional oil pipeline serves Salamanca, Tampico, and Tuxpan. The delivery of 30 M.M.c.f. of gas to Mexico City from Poza Rica will cease when the Ciudad Pemex pipeline is finished. Pemex will use this gas for reinjection.

San Andres field. This field now produces about 29,000 bbl. daily. Reserves are estimated at 190 million barrels with a 50% recovery factor. Hallazgo field nearby has 98 million barrels of reserves. San Andres has produced 36½ million barrels and Hallazgo 7.4 million barrels to date.

Current outlook. Several stratigraphic traps have been discovered in the Poza Rica district. Pemex hopes to find others, but has no basis for estimating how many exist. Pemex feels they will be drilling about 500 development wells in the near future. These wells are spaced 800 m. apart at the beginning. During 1960 they will drill 18 wildcats and 180 development wells.

Ciudad Pemex. Pemex has 25 producing fields in the Isthmus or South Zone of Mexico. The largest of these include: El Plan, 6,800 bbl. daily; La Venta, 10,300 bbl. daily; Ogarrio, 23,250 bbl. daily; Magallenes, 6,300 bbl. daily.

Pemex plans to drill 40 wildcats in the southern zone this year. About 200 field wells will go down. There are 40 rigs working in the area, averaging about 1 well per month. A new discovery was recently opened north of La Venta. No production in this area of Mexico comes from lower than the Lower Miocene.

- The South Zone produces 20% of Pemex' crude.
- To date, 1,600 wells have been drilled—700 of them producing.
- The drilling pattern is a staggered one. Gas wells are spaced 1,500 ft. apart, oil wells 200 ft. apart.
- Shallowest production is 300 m.—deepest is 2,800 m.
- Proved reserves total 300,000,000 bbl.
- Pemex feels that prospects for Oligocene production are very good.
- Of the 40 rigs working in the southern zone, 31 are Pemex, 3 are Pauley, and 6 are operated by other private contractors. Contractors plan to bring 12 more rigs into this zone this year.

Jose Colomo field. This field was discovered in 1951. Oil was found in the "C" zone. The principal "D" sand was opened in 1954. Production has been found in several other sands, but the "D" sand gas reserves are the largest with an estimated 2,250,000 M.M.c.f. This field is only 10 m. above sea level. The entire region is very swampy and the plant proper was located 5 miles southwest of the field on a small uplift. The plant had an original capacity for processing 260 M.M.c.f.d. recovering 52 bbl. per 1 M.M.c.f. This gives it a production of about 13,500 bbl. per day of liquid products. These include 50% of propane in the original gas. The Jose Colomo gas fields have a shut-in pressure of 3,000 psi.

La Venta. This field is also a major gas reserve. Plans call for a 100 M.M.c.f. plant here. Liquid products will be sent to Minatitlan. Eventually the two plants will handle 500 M.M.c.f.d. of gas, shipping 30,000 bbl. daily of light products to Minatitlan.

The Ciudad Pemex plant is similar to Reynosa except that it uses gas recycle.

The Ciudad Pemex plant employs 548 people. This includes 238 hourly workers and 38 supervisory personnel, the rest being clerical, maintenance, etc. The village comprises 80 hourly workers homes, plus 40 for other personnel.

Pemex has 120 million pesos invested in the plant itself with a total investment in plant and town of 150 million pesos.

Pemex now recovers 50% of propane but will later add refrigeration to boost recovery to 85%.

The original pipeline from Ciudad Pemex to Minatitlan was built 7 years ago. This line was not coated and Pemex has encountered serious corrosion problems. Magnesium anodes are now being used in the worst places. The company may have to build another line with full coating and wrapping.

A new gas pipeline will be built from Ciudad Pemex to Villa Hermosa and Coatzacoalcos. As the Mexico City gas line goes into operation, Pemex will be expanded to process 500 M.M.c.f.d.; 100 M.M.c.f.d. will be processed at La Venta. A 7 M.M.c.f. casing-head plant at Agua Dulce will provide Minatitlan with gas fuel.

Alberta wildcat indicates Triassic pay

Triassic oil production is indicated in a remote wildcat in the general Kaybob - Sturgeon Lake district in West Central Alberta, 160 miles northwest of Edmonton.

The prospective discovery extends Triassic oil possibilities another 18 miles east. Present most easterly oil production from this horizon is in Sturgeon Lake field.

Indications of production were given in the wildcat being drilled by Texaco Canada, Ltd., and Amerada Petroleum Corp. They were based on favorable showings in two drill-stem tests in the Triassic logged at 4,750 ft.

The first test took in 13 ft. of the zone plus 12 ft. above it. It recovered 100 ft. of light brown oil after getting a strong but ungaged flow of gas. The second covered a 39-ft. section with top packer set 8 ft. above the horizon's contact point, and extending 18 ft. below the initial test interval. It flowed an ungaged volume of gas and recovered 570 ft. of oil.

Full evaluation of the tests has not been reported but results were encouraging enough for operators to run a production string of casing.

Previously, drill-stem tests had been made in the shallower Bluesky and Fernie horizons. The former tested water, but 450 ft. of flat, low-gravity oil was recovered in the Fernie.

The test, designated as Texacan-Amerada-Snipe Lake 14, is in LSD 14, 29-69-19w5. It is 55 miles west of oil production in the Swan Hills area, and 30 miles north of Kaybob-Beaverhill Lake field. Nearest production of any kind is D3 reef oil at Sturgeon Lake 10 miles west.

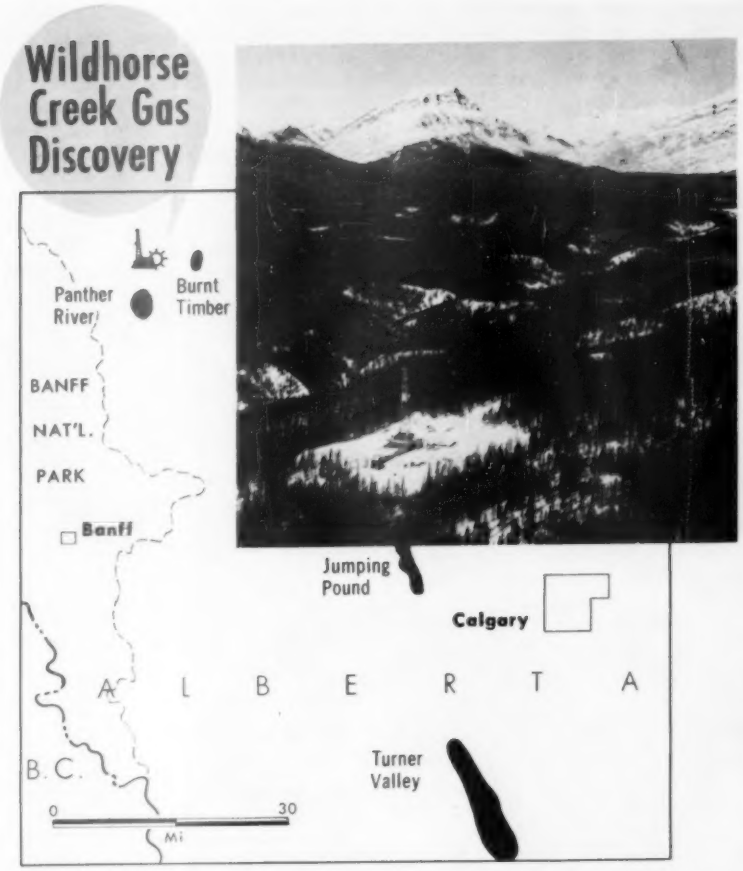
Location is on a drilling reservation acquired jointly by the two companies last November. These companies have two other separate drilling reservations in the same vicinity.

Hole of the indicated discovery well was drilled to the Cambrian. It is cased to the Beaverhill.

Michigan has new pinnacle-reef discovery

A new pinnacle-reef discovery is indicated in St. Clair County, Michigan. It is 1½ miles northeast of the Peters reef pool where a wildcat drilled by Ferguson & Harvey got a flow of gas in the A-1 Salina section at 2,420-76 ft. The flow gaged at rates up to 5 M.M.c.f.d. At 2,476 ft., operators have changed from cable tools to rotary to core deeper into the reef section.

Panhandle Eastern Pipe Line Co. continues production tests at 1 Toles, NW SE SW 7-5n-13e, on the Macomb County reef prospect. The wildcat, 2½ miles southwest of Berlin reef, cored oil saturation in Brown Niagaran from 3,790 to 3,969 ft. First tests of 120 perforations from 3,750-80 ft., followed with acid and sand fracture, were negative.



A MISSISSIPPIAN GAS DISCOVERY was made at a comparatively shallow depth in the Alberta Foothills region.

Alberta adds gas discovery

DEEP DRILLING along southwestern Alberta's Foothills has come up with another Mississippian gas discovery at a surprisingly relative shallow depth for this western Canada trend of fields.

The discovery is by Texas Gulf Sulphur Co., group operator, at its Wildhorse Creek wildcat in the Burnt Timber-Panther River region. It is 60 miles northwest of Calgary and about 30 miles north of the town of Banff.

Its Mississippian zone was topped at 7,150 ft. with the gas coming in about 7,400 ft. This compares with the 12,250-ft. depth of the Mississippi zone at Shell Oil Co.'s Panther River field, 7 miles southwest, and 11,100-ft. depth at Shell's Burnt Timber discovery only 6 miles east.

A drill-stem test of a 120-ft. interval at 7,468-7,588 ft. is reported to have flowed at a rate of 8,200 M.c.f.d. at one time but leveling off at 7,150 M.c.f.d. The test was open 50 minutes. With a 500-ft. diesel-oil cushion, gas was at the top within 2 minutes.

The well is Texas Gulf's first drilling operation in Canada. The Houston company—major producer of sulfur on the Gulf Coast—has been operating a sulfur-extraction plant at Okotoks, south of Calgary.

Associated with this company in the Wildhorse Creek drilling venture are Midwest Oil Corp., El Paso Natural Gas Co., Peerless Oil & Gas Co., Western Natural Gas Co. (formerly Gulf States Oil Co.), and Minoils, Ltd.

Location is in LSD 6, 22-31-10w5 on a 10,240-acre lease spread (Alberta Drilling Reservation 409) that fans out from the discovery hole. The tract was purchased originally in the name of Canex Aerial Explorations, Ltd., a subsidiary of Vancouver-based Canadian Exploration, Ltd. The latter, a mining firm, paid a cash bonus of $164,454.40 for the lands contained in the drilling reservation, purchased a year ago, and entered a farmout agreement with the Texas Gulf group. This was Canadian Exploration's first venture into the oil and gas business.

For the time being, the 7,400-ft. Mississippian zone is being passed up. With a drilling commitment to probe the Mississippian to a depth of 9,500 ft., operators are coring ahead for further evaluation of the horizon. Consideration also is being given to deepening the hole to the Devonian, which is productive of 87% hydrogen sulfide gas in a Shell Oil Co. discovery at nearby Panther River. Looking ahead, a sulfur-bearing gas find at Wildhorse Creek comparable to that at Panther River could put Texas Gulf in the sulfur-producing business in another sector of Alberta.

Utah's Northwest Lisbon perks up

Commercial flows of gas and condensate have been reported at Elliott Production Co. 1 Lisbon Valley C, in Section 9-30n-24e, San Juan County, Utah. Through ¾-in. choke opposite Mississippian perforations at 8,767-8,830 ft., the well flowed 3,117 M.c.f.d. gas and condensate gaged at 21-38 bbl. per hour.

This producer lies 1 mile west of Pure Oil Co.'s sensational Northwest Lisbon Devonian strike; the Elliott had no shows in Devonian.

Meanwhile, Pure gaged gas at 8,750 M.c.f.d. at its 1 USA-C, Section 4-30s-24e; the 1-hour test also flowed condensate at 30.5 bbl. rate. This production is from Mississippian.

At the same time, Pure announced location for 2 USA-D in 13-30s-24e; it lies 1 mile east of 1 USA-B and a mile north of 1 USA-D, all Pure operations. The USA-B, in 14-30s-24e, is flowing McCracken-Devonian oil at 216 bbl. per day, second pay in this well (Mississippian pay is shut in). The USA-D is drilling near 4,000 ft.

Another North Dakota county gets oil

At a rank wildcat in North Dakota, a new oil discovery is indicated that will extend production further southeast in the Williston basin. It would be the first oil in a new county—McHenry—in the north central portion of the state.

On test from 4,200-13 ft., Cardinal Petroleum recovered 325 ft. of free oil in the Mission Canyon zone. Operation is 1 Herdt-Bank of North Dakota, C NE NE 6-158n-80w, McHenry County. Along with the free

oil, tool showed 300 ft. of gas-cut muddy oil which was estimated at 75% oil. Open 2 hours, final flowing pressure was 263 psi., final shut-in pressure after 1 hour was 1,793 psi.

Operator set casing to 4,201 ft. and will try an open-hole completion from 4,201-13 ft.

New field opened in Rio Grande Valley

A new gas condensate field has been opened by Bright & Schiff about 2 miles southeast of Mercedes in Hidalgo County, in Texas Rio Grande Valley.

Discovery well, 1 Somnitz, in Section 38, Capisallo Subdivision of Llano Grande Grant, has an absolute open-flow potential of 8,300 M.c.f.d.

Completion is from Frio sand perforated at 8,339-49 ft. with casing run through the pay to 8,455 ft. Gravity of the liquid recovered is 56°.

The name of Santa Maria has been asked for the new field.

Louisiana field is extended

Extension of Bayou Chevruil in Lafourche Parish, South Louisiana, more than ½ mile east has been made by J. C. Trahan Drilling Co. at its 1 City of New Orleans.

Trahan's new well is rated good for 279 bbl. of 54.2°-gravity condensate per day. Gas volume gaged at 3,800 M.c.f.d. Flow was tested through 14/64-in. choke with tubing pressure at 4,140 psi.

Completion is in from perforated interval at 12,587-99 ft. Total depth is 12,703 ft.

Montana group slates annual field trip

The eleventh annual field conference of the Billings Geological Society will be held in the Hebgen Lake-Madison Valley of southwestern Montana during September 7-10, 1960.

Registration will take place on the afternoon of September 7 in West Yellowstone. The conference will begin in the evening in West Yellowstone with a banquet which will feature one or more known speakers.

The field trip will begin on the morning of September 8 and will proceed to the Hebgen Lake (earthquake) area where the entire day will be spent studying the earthquake phenomena. The group will return to West Yellowstone in the evening where another special program with a featured speaker is planned.

On the second day of the field trip the group will proceed from West Yellowstone to the slide area via Reynolds Pass. Subsequently the conference will return to West Yellowstone and proceed through the Centennial Valley to a campout point in the southern part of the Gravelly Range.

On the final day of the conference, September 10, the group will cross the Gravelly Range to Ennis and into the Jack Creek area where the conference should conclude late in the afternoon.

Reservation and accommodation application blanks can be obtained from: Richard L. Jodry, P. O. Box 219, Billings, Mont.

Texas dry hole converts to gas

A deep Texas wildcat test drilled earlier this year and plugged as a dry hole is being converted into a Lower Morrow sand gas producer.

Originally drilled to 9,346 ft. by Baker & Taylor Drilling Co., the test (1 Wolf Creek Park), 14 miles southeast of Perrytown, in southeastern Ochiltree County, Texas Panhandle, recently was taken over by Ridgeway & Morrison.

New owners cleaned out the old hole to 9,125 ft., cemented a string of 2⅞-in. pipe at that depth, and perforated at 8,954 ft. After fracturing, the well kicked, and blew in flowing 1,400 M.c.f.d. of gas through ¾-in. choke.

Bottom of the original hole at 9,346 ft. is in the Mississippian, topped at 9,190 ft. with ground elevation of 2,706 ft. Top of the Morrow was logged at 8,437 ft., and the Lower Morrow sand at 8,945-64 ft.

The discovery is about a mile northwest of Lower Morrow gas production in Parnell field. It is 1¼ miles southeast of Northrup field, gas-productive from the Douglas zone.

Southwest Texas field is named

A new gas-discovery by W. J. Steeger in southwestern Zavala County, in far Southwest Texas, is being designated as Comanche Creek field.

Discovery well, 1 Roy Erskine, is in Section 317, C. C. Gibbs Survey, 11 miles west of Crystal City. It is southwest of Torch field.

From pay at 2,472-82 ft., the well flowed 600 M.c.f.d. through 14/64-in. choke. Total depth is 3,400 ft.

Ninth straight California strike for driller

A new success record has been set by Occidental Petroleum Corp. in the Arbuckle area of northern California.

The company is completing its ninth gas well in a row without a dry hole.

The well, 1 Occidental-Hahn, flowed at the rate of 1,325 M.c.f.d. in a drill-stem test at 5,540-71 ft. in the area's Upper C zone.

Hole since has been drilled to 5,790 ft. and casing run for production tests with perforations taking in not only the above tested interval but also an additional 20 to 25 ft. in the same zone.

The well is one which had been drilled originally by Western Gulf Oil Co. in 1958, and abandoned as dry. With later information, Occidental went back in the old hole, whipstocked, and directionally drilled across a fault block into the new extensive gas reservoir.

Location is in the Arbuckle extension gas field, in Colusa County. Spot location is in 28-13n-2w.

North Texas well hits Mississippian pay

Mississippian oil production has been proved in a deeper-pay and extension wildcat ¾ mile north from 700-ft. Gunsight sand production in North Texas' Young County Regular field. Nearest comparable Mississippian production is 1½ miles southeast in Ragland field.

The new Mississippian oil is in open-hole section at 4,793-4,808 ft. in Anderson Oil & Gas Co.'s 1 E. H. Griffin, Section 205 of TE&L Survey. The well flowed 116 bbl. of 43°-gravity oil per day through 6/64-in. choke with pressure of 740 psi. on the tubing side.

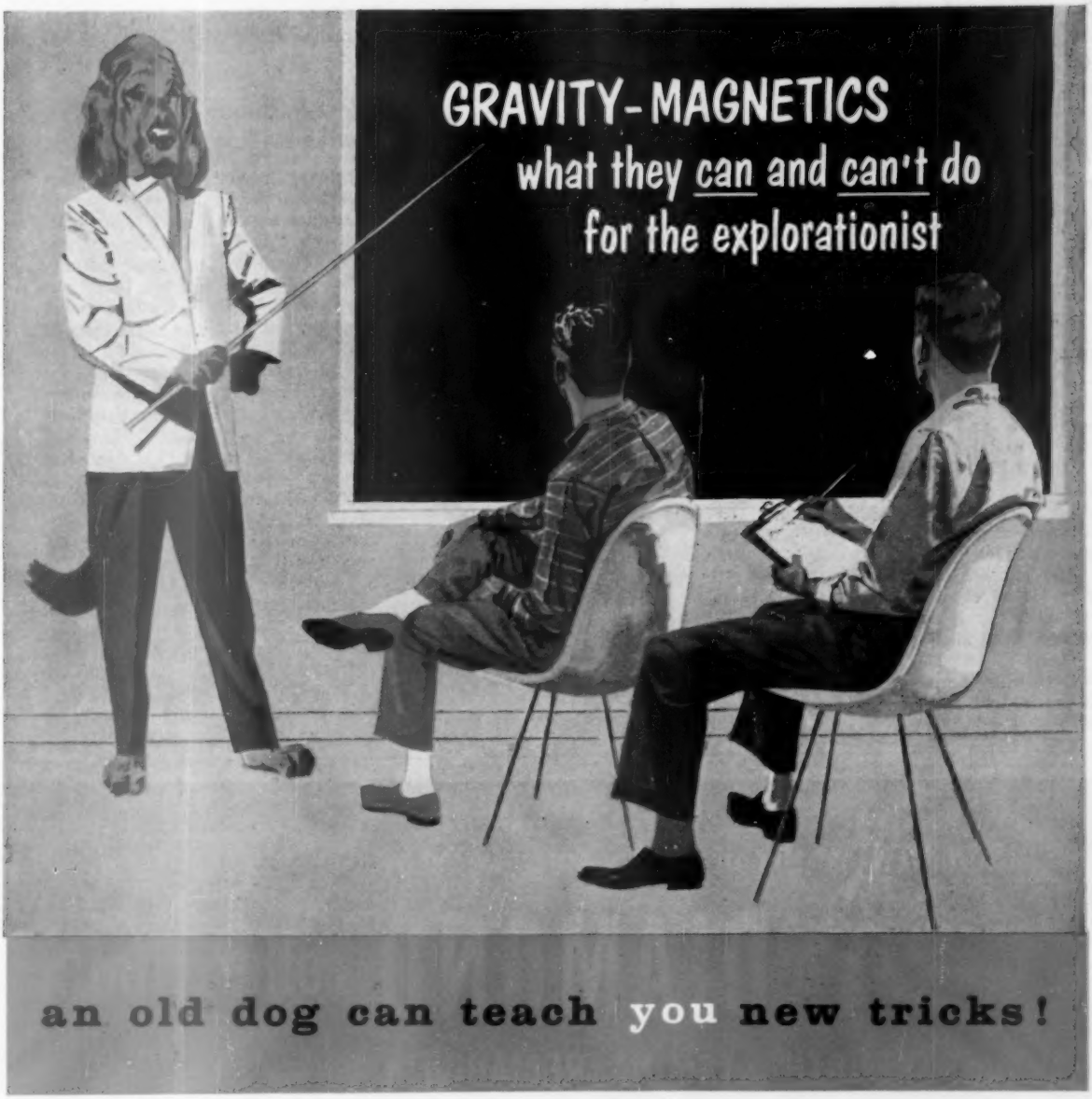
Some gas and muddy oil also were tested in the Caddo formation at 4,032-41 ft.

Mississippian production in Ragland field is at 4,900-ft. depths.

Deep pay hit in Texas

A deeper pay has been opened in the West Beckham area of West Central Texas' Nolan County. It is in the Lower Tannehill section at 3,558-62 ft. Present production in the field also is from the Tannehill, but a higher zone.

The new discovery, by Lauderdale & Strawn Drilling Co., is a quarter mile south of present production. Discovery well, 1 Josephine Daniel, pumped 84 bbl. of 42°-gravity oil on a 12-hour potential test. Gas-oil ratio was 1,100 cu. ft. per bbl. Total depth is 3,612 ft.



"Dog-eared" is a term sometimes applied to gravity and magnetics as exploration tools, but these "old guard" methods of exploration can teach many of us new tricks about getting certain prospects surveyed quickly, efficiently and economically.

A number of tails began wagging after explorationists stood up on their hind legs and took a new sniff at prospects via the gravity-magnetics route. If you are interested in cutting costs, while answering specific geologic questions, give us a whistle and we'll trot out our new Bulletin GM59-1, **"Gravity-Magnetics . . . what they *can* and *can't* do for the explorationist."**

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Prospects brighten for deep N. M. pay

PROSPECTS of deeper production in the Jalmat area of southeastern Lea County, New Mexico, are brightened by the good gas flow Shell Oil Co. got in a drill-stem test at 12,730-12,866 ft. in its 1-36-B State, a deep exploratory test 4 miles northwest of Jal.

Flow through ½-in. choke was at the rate of 11,500 M.c.f. per day. On ¼-in. choke it was 3,300 M.c.f.d. Gas was at the top within 4 minutes after the tester was opened.

A 2½-hour test at 12,580-12,626 ft. got 300 ft. of oil and 240 ft. of heavily oil and gas-cut mud. Previously, a shallower formation at 9,843-63 ft. had flowed at the rate of 2,500 M.c.f.d. in a 45-minute test, recovering 2,356 ft. of gas and slightly oil-cut mud. A small volume of gas also was tested at 10,745-10,930 ft.

The indicated deep discovery is a north offset to a 3,525-ft. dry hole, but otherwise is surrounded by production from shallow pays.

Shell's new Devonian discovery well 10 miles northeast of Maljamar, in adjoining Eddy County, continues to test. The well, 1 Henshaw Deep Unit, flowed 145 bbl. of condensate with 3 M.M.c.f.d. of gas through 18/64 choke on latest reported test. Pay is perforated at 11,680-84 ft.

This well is on the northwest edge of the shallow Henshaw field. It is 5 miles from any other Devonian production, nearest being in Lucky Lake field, 5 miles north.

New Mexico has Abo Reef discovery

Deeper drilling by James P. Dunigan in the old shallow Corbin field area, 7 miles southeast of Maljamar, in Lea County, New Mexico, has resulted in a good Abo Reef oil discovery.

Dunigan's new discovery well, 1 Denius-Federal, flowed 502 bbl. of 38.6°-gravity oil daily through 22/64-in. choke from a 43-ft. perforated interval at 8,710-53 ft. in the reef section. Flow was with gas-oil ratio of 918 cu. ft. per bbl. and pressure of 510 psi.

The well had a total of 250 ft. of porosity in the section, topped at 8,571 ft.

Phillips Petroleum Co. already is starting a north offset to the Dunigan well.

Corbin field, discovered in 1938, has been productive from the Queen formation at depths of 3,700 to 4,200 ft.

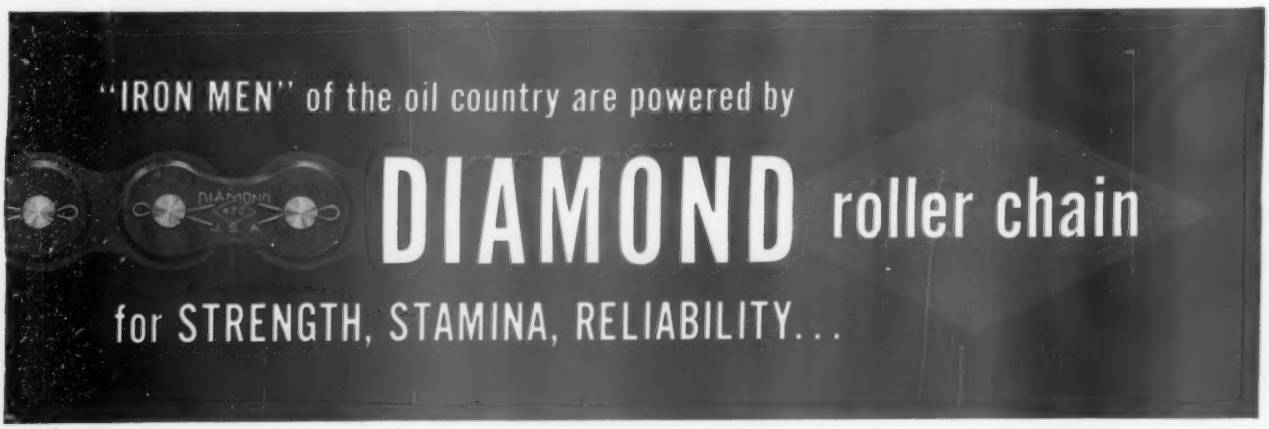
West Michigan find sparks drilling action

Proving the first good shallow prospect found in western Michigan in more than a year, Flory Drilling Co. 1 Baron, SE SE NW 21-14n-16w, Ferry Township, Oceana County, is flowing 125 to 165 bbl. of oil per day through 21/64-in. choke. Production is from Traverse limestone at 1,950 ft.

Fast development in the area is indicated. Five rigs already are drilling and five additional locations have been staked.

Panhandle Eastern Pipe Line Co. is testing Niagaran reef porosity at 3,740-3,840 ft. on 1 Toles, NW SE SW 7-5n-13e, Armada Township, Macomb County wildcat. Niagaran section, logged at 3,689 ft., was negative on drill-stem test at 3,685-3,740 ft.

Robert Bond 1 Van Antwerp, SE SE SE 19-20n-10w, Burdell Township, Osceola County, deepened from Dundee pay at 3,683 ft. to the Reed City at 3,804 ft., averaged 145 to 164 bbl. per day, flowing natural on 22/64-in. choke over past 6 days.



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Lake Erie offshore well blows in

Place Walpole 12, the first well of the 1960 season to be drilled by Place Gas & Oil Co. Ltd., on its offshore gas field in the Selkirk area of eastern Lake Erie, blew in recently with a natural open gas flow of approximately 900 M.c.f.d. from the Red Medina formation.

In announcing the new drilling success, Clifford R. J. Smith, president of the company, stated the good bottom-hole pressure of the well confirms results obtained in last season's step-out drilling which revealed bottom-hole pressures increased as drilling progressively extended out in the lake. Located ½ mile due south of the company's No. 7 producer, the No. 12 well, apart from adding materially to the "drilled gas reserve" picture, indicates an expanding gas-reserve potential of considerable magnitude since as the company already has production to the west, southwest, and northeast, obtained in last season's drilling successes.

At the company's oil development in the Colchester area of western Lake Erie, drilling is expected to start next week on the Place Colchester 4 well which was suspended last year at a depth of 1,200 ft. owing to weather conditions. The storage tank battery on land has now been completed at Colchester.

Drilling play moves north in Ohio's Swan

The drilling play in Swan Township, Vinton County, Ohio, has moved north.

Roberson-Williams have an extension to the pool at their 1 W. H. Maxwell, Section 2. It gaged 3,620 M.c.f.d. with a rock pressure of 880 psi. 2 weeks after fracturing. Natural production from the Clinton sand at 2,835-65 ft. was 996 M.c.f.d. with a show of oil.

John Adger has his third success in his Clearfield Bit. Coal Co. well in Section 22, Pike Township, Perry County. It made 80 bbl. of oil and an estimated 300 M.c.f. of gas in a 24-hour test 2 weeks after fracturing. Clinton sand in this eastern extension to the Bristol pool was logged at 3,487-3,500 ft.

Another test for production in the deeper sediments west of the Clinton pinchout has been announced. W. H. Patten is moving in on 1 C. C. Martin, Hartford Township, Licking County, for a rank wildcat.

Geology group aids teaching, research

The University of Texas Geology Foundation has raised nearly $250,000 in the past 6 years to aid geology teaching and research and provide scholarships for promising students.

Dr. Samuel P. Ellison, university geology-department chairman, reported that figure to the foundation's advisory council of 16 oil industry executives and geologists during the council's annual spring meeting.

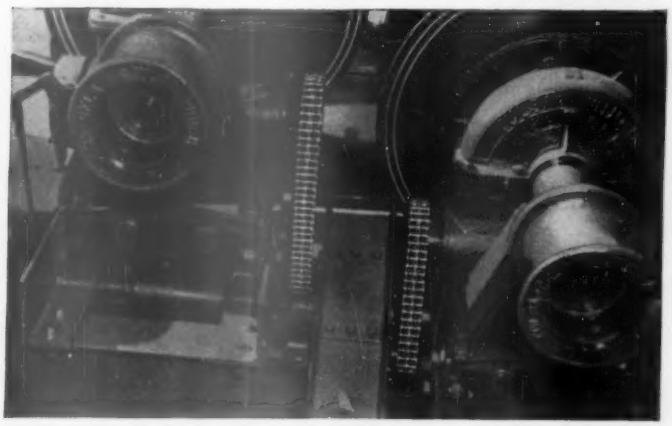
A large percentage of that amount has gone into investments and the geology department uses the accumulated interest, Dr. Ellison pointed out.

The council discussed the possibility of raising funds for a new geology building, following a report of increased graduate-student enrollment.

Dr. Stephen E. Clabaugh, university geology professor, termed 1950-60 a "decade of transition" from undergraduate to graduate emphasis.

"The 35 doctoral candidates now enrolled are a greater number than we have trained in the department's 70-year history," he said.

"Our graduate enrollment now equals the number at Harvard and other leading schools. We have run out of space for research laboratories,



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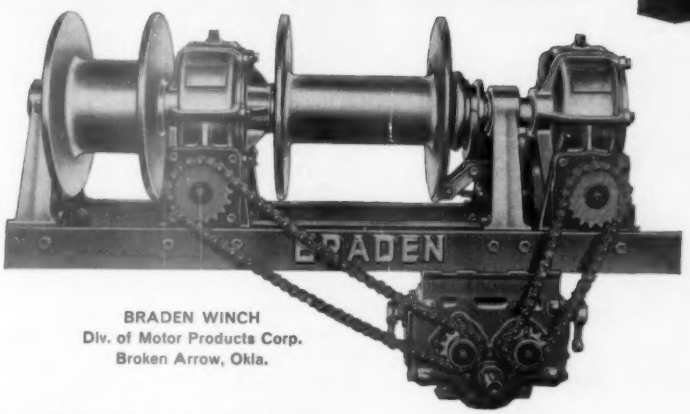

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library growth, and student work areas," Dr. Clabaugh pointed out.

"Meanwhile we have not abandoned undergraduate teaching, although the number of majors has declined. We will graduate about 100 seniors in the current 12 months."

Dr. H. H. Ransom, University of Texas president-to-be, spoke at the meeting and related changing conditions in geology to changes in the whole university.

Morgan J. Davis of Houston, Humble Oil & Refining Co. president, who is chairman of the Geology Foundational Advisory Council, presided.

Texas' Garza has Strawn discovery

DISCOVERY of a new Strawn (Pennsylvanian) sand field is virtually assured for southern Garza County, in West Central Texas.

General American Oil Co.'s 1-A-63 Koonsman, a projected 8,300-ft. wildcat in Section 63, Block 6, H&GN Survey, 8 miles southwest of Justiceburg, flowed 15 bbl. of oil per hour through ¼ in. choke in a drill-stem test of Strawn sand showing at 7,811-7,945 ft.

When tester was closed after being opened 2 hours, 7,675 ft. of oil and 270 ft. of heavily oil-cut mud were reversed out of the hole. No water showed.

Gas was at the surface in 5 minutes and oil within 50 minutes after the tester was opened. Flow pressure ranged from 1,285 to 3,025 psi. Shut-in pressure was 3,205 ft. after tool was closed.

With hole deepened to 8,065 ft. another drill-stem test of 119 ft. of sand from 7,946 ft. recovered 4,386 ft. of free oil with 200 ft. of heavily oil and gas-cut mud and 300 ft. of water. Tester was open 2½ hours with flow pressure ranging from 280 to 1,135 psi.

An earlier test at 7,751-7,810 ft. got 2,600 ft. of free oil with 60 ft. of mud and 500 ft. of mud-cut oil. Tool was open 3 hours and 10 minutes.

The discovery is near the Borden County line and about 1½ miles northeast of Koonsman field, in that county. It is 2½ miles east of Red Loflin field. Koonsman produces from the Spraberry. Red Loflin has Strawn and Ellenberger production.

Oklahoma's Kingfisher adds another Manning gas strike

Open-flow potential of Apache Oil Co.'s new Manning sand gas discovery west of Kingfisher, in Kingfisher County, Oklahoma, is placed at 1,500 M.c.f.d.

Completion of the well, 1 Sanders, in 11-16n-8w, adds another link in the chain of Manning discoveries being stretched across this county.

Pay in this well is perforated at 7,941-53 ft., 7,960-64 ft., and 7,968-72 ft. Hole was drilled to 8,089 ft.

The recently opened North Hennessey field, in the north part of the same county, is getting its second well and another producing zone in its Lower Mississippian horizon.

Drilled by Humble Oil & Refining Co.'s Carter division, it is a southwest offset to Slats Honeymon Drilling Co.'s discovery well.

With pay perforated at 7,096-7,106 ft., 7,132-42 ft., 7,144-54 ft., and 7,164-74 ft., it flowed at the rate of 1,800 M.c.f.d., and in a 2 hour gage through 11/64-in. choke it recovered 2 bbl. of condensate. Flow was under pressure of 1,180 psi. shut in. Shut-in pressure at 10 hours stood at 1,975 psi.

Both this well, 1 Huntsberger, and Slats Honeymon's discovery well, 1 Brown, are in 11-19n-7w.

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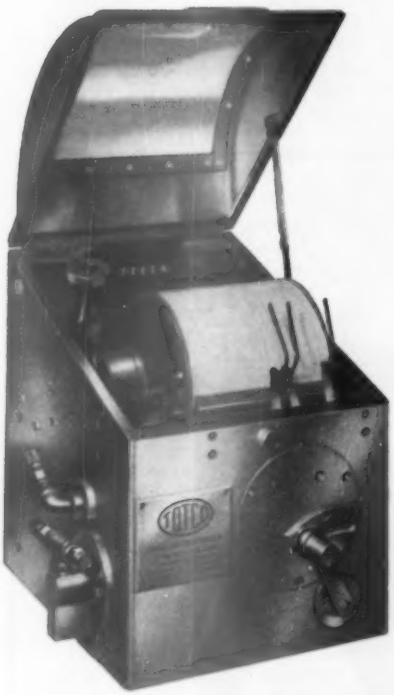

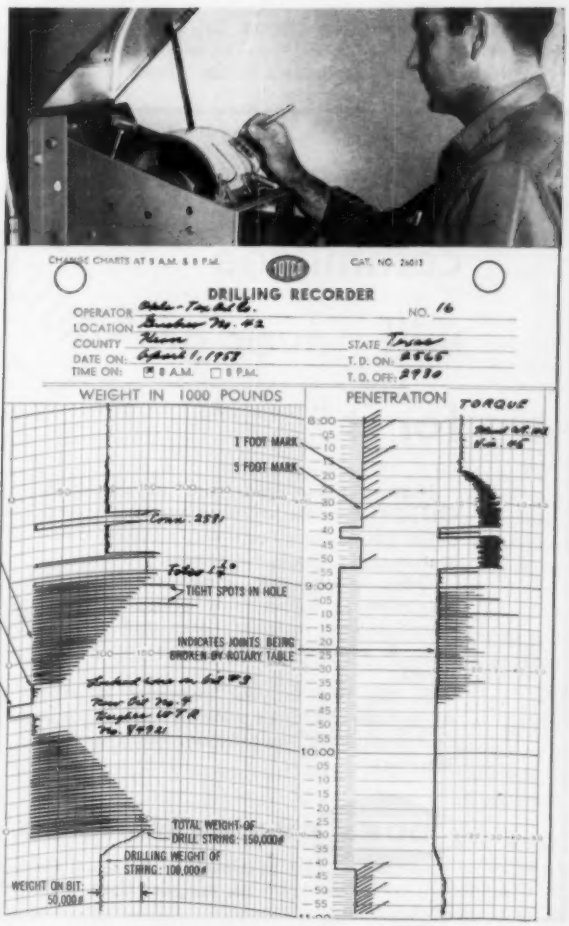

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New books released by Oklahoma Survey

The Oklahoma Geological Survey in Norman has released two circulars, 53 and 51, dealing with areas of the Arkoma basin.

Circular 53 covers the geology of the Featherston area, by Robert E. Vanderpool. This area is in East Central Oklahoma in northeastern Pittsburg County. Rocks of the upper part of the McAlester formation, the Savanna formation, and the lower part of the Boggy formation crop out in the area. Three anticlines and two synclines are the major structural features. Coal has been produced and is now of little importance. Small gas fields are getting gas from the Hartshorne formation.

Circular 51 deals with the geology of the Cavanal syncline, by Philip K. Webb. This area is also in East Central Oklahoma from 3-4 miles west and northwest of Poteau, county seat of LeFlore County. The Cavanal syncline is expressed at the surface by Cavanal Mountain and the Potato Mountains. Exposed rocks are of the Savanna and Boggy formations, Krebs group, Des Moines series. The syncline is a broad downwarp cut by north-south faults.

With the growing importance of the Arkoma basin of eastern Oklahoma and western Arkansas, these new circulars will add much to the geological information of the region.

Deep Texas strike has two pays

Virtual assurance of discovery production has been given in at least two horizons in the deep wildcat test Southern Minerals Corp. and General Crude Oil Co. are drilling in west central Pecos County, in far-West Texas.

The more promising horizon of the two is in what is believed to be the Wolfcamp section. A drill-stem test, open 1½ hours, in this section at 6,068-93 ft. recovered 3,440 ft. of oil with 90 ft. of drilling water after flowing gas at rates of 40 to 60 M.c.f.d. Flowing pressure ranged from 175 to 680 psi. Shut-in pressure after 20 minutes was 1,975 psi.

The other horizon, the Lower Clearfork, was tested from 5,444 to 5,900 ft. With tester open 1½ hours, recovery was 45 ft. of oil and 210 ft. of mud. Flowing pressure ranged from 195 to 250 psi. Shut-in pressure was 335 psi.

The wildcat is on the operators' Jasper CSL lease in Block 104. This is about 28 miles southeast of Fort Stockton. It is 3 miles northwest of Hokit field, productive from the Pennsylvanian Strawn sand at 9,400 ft.

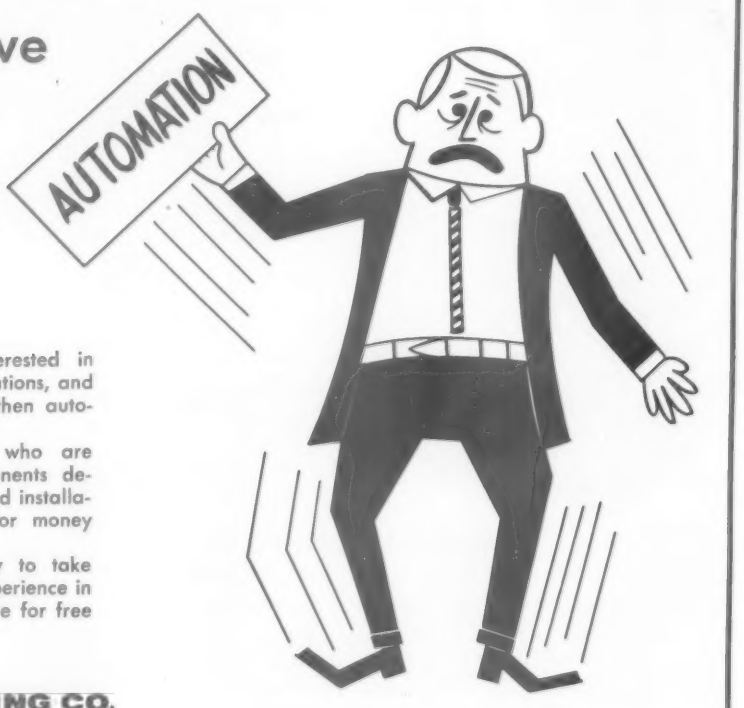
Started with an 11,000-ft. drilling objective, the Southern Minerals-General Crude wildcat is passing up the shallower prospective pays for the time being for a look at the lower potentialities.

Texas' Taylor has Morris production

NEW Morris sand production is being opened in northern Taylor County, in West Central Texas. Its discovery well, drilled by Daya Operating Co. and W. J. Fulwiler, Jr., as joint operators, is a mile west of Caps and 1¼ miles south of Thornton Caps Lime area, nearest production. The discovery is being classified as an extension of Taylor County Regular field.

Pay zone of the new well, 1-60 Evans, is perforated at 4,190-98 ft. with top of the Morris sand at 4,182 ft. from rotary bushing elevation of 1,822 ft. Hole was drilled to 4,528 ft. and is cased to 4,486 ft. Potential rating of the well is 158.23 bbl. of oil per day through 12/64-in. choke. Flow is with gas-oil ratio of 780 cu. ft. per bbl., and pressure of 355 psi. Gravity of the oil is 43.3°.

"The executive committee will never go for it."



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Offshore Louisiana gets strike

THE LAKE SAND area of East Cote Blanche Bay opening into the Gulf of Mexico off the coast of Iberia and St. Mary parishes, Louisiana, has come up with another rich gas-condensate discovery.

It is about 3 miles south of the original Lake Sand field offshore from large Marsh Island on the Iberia Parish side of the line.

There, a deep wildcat drilled by Shoreline Exploration, Inc., flowed 204 bbl. of 54°-gravity condensate with 3,560 M.c.f.d. of gas while testing through 10/64-in. choke.

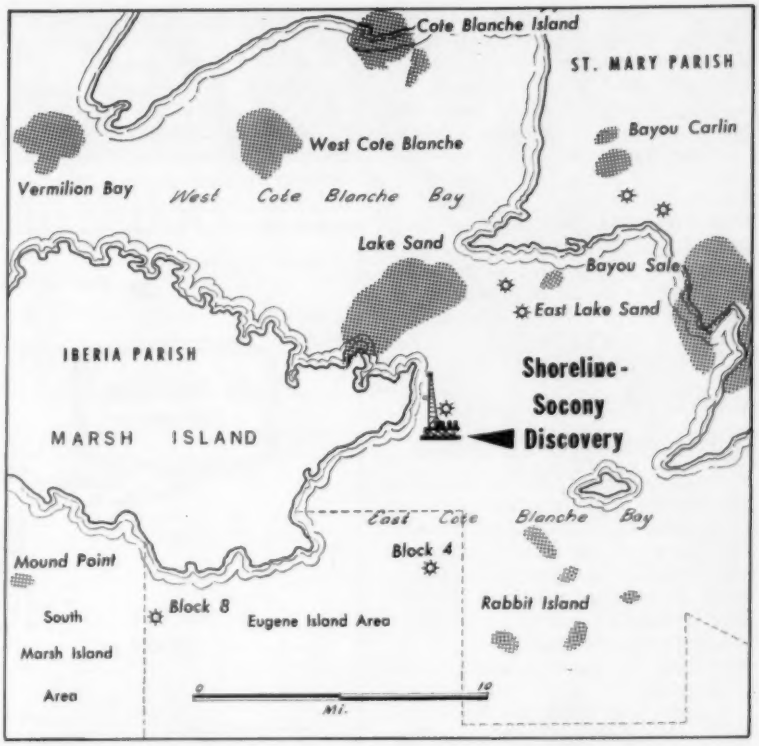
Flow was under pressure of 8,200 psi., one of the highest pressures so far registered in the Lake Sand area.

The well was drilled to 16,500 ft., and has 5½-in. casing to 15,560 ft. Producing zone, in lower Miocene, is perforated at 14,843-59 ft.

Location is on a 3,975-acre lease (State Lease 3320) obtained by Magnolia Petroleum Co. (now Socony Mobil Oil Co.) at the state lease sale in January 1958 for a bonus bid of $1,872,777.

The new well is the second test on the lease. It is southwest of the first, drilled by Magnolia and abandoned as dry at 16,185 ft. Locations already have been made for two additional tests.

Original Lake Sand field was discovered by Humble Oil & Refining Co. in 1949. Spreading over a wide area where East and West Cote Blanche Bays come together between Marsh Island and the St. Mary Parish mainland, this field now has 26 producible wells with production from 10,000 and 11,000-ft. sands.



SOUTHWEST of a previous dry hole, a deep wildcat drilled by Shoreline Exploration, Inc., struck a rich gas-condensate pay just off the shore of Marsh Island in Louisiana.

Several miles east of this in what is designated East Lake Sand field, another rich and deeper gas-condensate producing area appears to be in the making. It was opened in 1958 by C. G. Glasscock and others with production from a 13,700-ft. pay. Since then, Sunray Mid-Continent Oil Co. has proved a 15,000-ft. sand, Union Oil & Gas Corp. drilled a 16,452-ft. well, completing in a 12,970-ft. horizon.

Between these wells and older Bayou Carlin field at the point of the St. Mary Parish mainland, additional deep gas-condensate production has been found in several deep wells that may prove a continuous trend.

With this development and such other large fields in and adjacent to East and West Cote Blanche Bays as Cote Blanche Island, West Cote Blanche Bay, Bayou Sale, Horseshoe Bay and Rabbit Island, this is becoming one of South Louisiana's richest sectors.

Gas discoveries enliven North and Central California

A GOOD GAS DISCOVERY has been made in the busy gas area west of the San Francisco Bay region, and another in northern California.

G. E. Kadane & Sons, Newport Beach, Calif., operator, has completed a gas well in 20-6n-2e in Solano County. It is about 2½ miles northwest of Maine Prairie gas field. Maine Prairie is about 60 miles northwest of San Francisco.

No flow was given on the Kadane well, the Maine Prairie 1, Gas Unit A. The well was drilled to 7,501 ft. The operator set 5½-in. casing to 7,000 ft.

About 50 miles to the southwest in San Joaquin County, Great Basins Petroleum Co. of Los Angeles is preparing to spud its third well in the recently-discovered McMullin Ranch field. Location is in the southwest corner of Section 15-2s 6e about 1½ miles northwest of the field.

The new well, Picchi 66X-15, will go to 6,500 ft.

Production in McMullin Ranch is from between 5,000 and 6,000 ft. Late in May Great Basins completed its second well, a dual completion, at an initial rate of 9,500 M.c.f. daily.

About 15 miles south of McMullin Ranch, McCulloch Oil Exploration Co. of Los Angeles is drilling ahead after testing a zone at 4,472 ft. McCulloch-Lamb 1 is in 12-1s-4e. The wildcat is 6 miles southwest of Roberts Island and 8 miles northwest of Tracy gas fields.

In northern California. Zephyr Oil Co. has come up with an 800 M.c.f.d. gas well in its wildcat in Humboldt County, after having noncommercial shows in a deeper zone.

The discovery, Leon Oro Blanco T-1, has been completed at 4,800-10 ft. Earlier shows at 5,590-5,652 ft. were noncommercial (OGJ, June 13,

p. 185). Zephyr, a Long Beach company, is drilling a second well 2,000 ft. west of the discovery.

In another gas development in northern California, the 2 James W. Morgan et al., in Tehama County, has been completed as a commercial gas well and as the first extension of the discovery, which was made in December 1958. No flow has been reported on the stepout.

The No. 2 is located in 8-23n-3w and is about 1,400 ft. northwest of the discovery. The extension was completed at 4,500 ft.

Deep Montana well hunts new gas source

A DEEP TEST for gas will be started before July 1 in the Two Medicine Creek area of Glacier County, about 41 miles west of the Cut Bank oil and gas fields, it was announced jointly by J. E. Corette, president of Montana Power Co., and W. Layton Stanton of Denver, manager of the Rocky Mountain division of Union Oil Co. of California.

Corette said Montana Power has an arrangement with Union, calling for the utility to pay for a well on land which is held by Union. In consideration of underwriting the cost of the well, Montana Power will acquire an interest in the leases.

Great Northern Drilling Co. will be the drilling contractor. Specific location for the well has not been reported.

Efforts to unitize the field are proceeding. The USGS has given preliminary approval of unitization of the federal lands involved. Unitization provides for development of the acreage and sharing of possible production by land and lease owners in specified parts of the unit near any producing wells.

The test, as tentatively planned, will be drilled into the Madison formation to a depth of about 9,200 ft. The land is on the Blackfeet Indian Reservation in an area where Union has extensive leases.

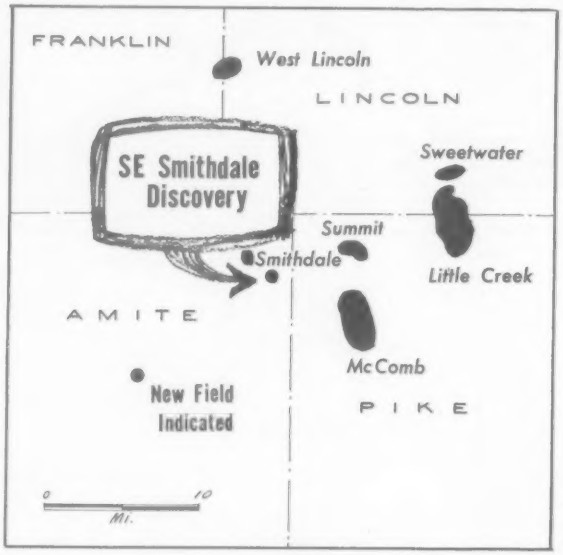
Stripper-well survey completed

ALBERT E. SWEENEY, JR., director of technical services of the Interstate Oil Compact Commission, has announced that the national stripper-well survey as of January 1, 1959 has been completed. This survey was a joint project of the Interstate Oil Compact Commission, the Independent Petroleum Association of America, and the National Stripper Well Association.

This survey reveals that the 373,870 stripper wells in the United States as of January 1, 1959, produced 511,842,135 bbl. of oil for an average of 3.75 bbl. per day per well.

It is estimated that approximately 11% of the oil reserves of the United States are in these stripper fields and that these fields are capable of producing slightly more than 11% of the total United States reserves under secondary-recovery methods.

Stripper wells represent 65% of all the wells in the United States, and accounted for approximately 21% of the total oil produced in 1958.



TUSCALOOSA OIL find in Mississippi falls directly between McComb and Smithdale fields.

Mississippi strike straddles Smithdale, McComb gap

COMPLETION of a Tuscaloosa oil well about midway in the 5-mile gap between the northwest side of the large McComb field, in western Pike County, Mississippi, and the recently completed discovery well of Smithdale field in adjoining Amite County, has raised some question as to which field, or neither, the new well belongs.

The well in question was drilled by Warrior Oil & Gas Co. and Paul A. Radzewicz on their Prestridge Unit acreage in the SW SW of 26-4n-6e. This is about 2½ miles southeast of Larco Drilling Co.'s Smithdale discovery and so far only well, completed last April. It is only a little more than 3 miles northwest of the most northwesterly well in the 10-month old McComb field.

Initially, the new Warrior-Radzewicz well flowed at the rate of 408 bbl. of oil daily through 10/64-in. choke with pressure of 1,875 psi. and gas-oil ratio of 1 M.c.f. per bbl., indicating a good well. Since then, after starting to make a sizable volume of water, it has been squeeze cemented to shut off the water. It will be reperforated in for another completion attempt.

Pay-zone is the same and at comparative depths as that productive both in McComb and the new one-well Smithdale field. Other factors and conditions, including gravity of the oil (41°) are comparable.

For the time being, the new discovery has been designated as a new field with the name of Southeast Smithdale. If it proves to be an extension of Smithdale field, the directional listing can be dropped easily without any complications. Likewise, if it is an extension of McComb, it readily can be absorbed by that field.

As a possible double-extension and link in connecting Smithdale and McComb, it could lead the way in giving South Mississippi its largest field in areal extent.

Pay of the new well is perforated at 11,058-60 ft. in 15 ft. of net oil sand at 11,055-70 ft. Subsea top of the Lower Tuscaloosa with derrick-floor elevation of 418 ft. is 10,543 ft. This is only 10 ft. lower than the subsea top in the Smithdale discovery well (derrick-floor elevation 437 ft.). It compares with subsea depths of 10,400 to 10,440 ft. at McComb.

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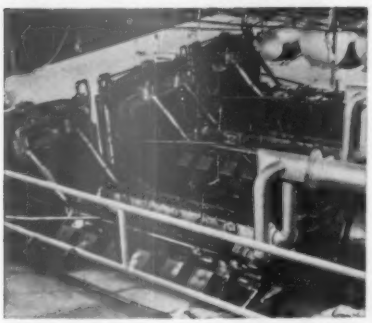

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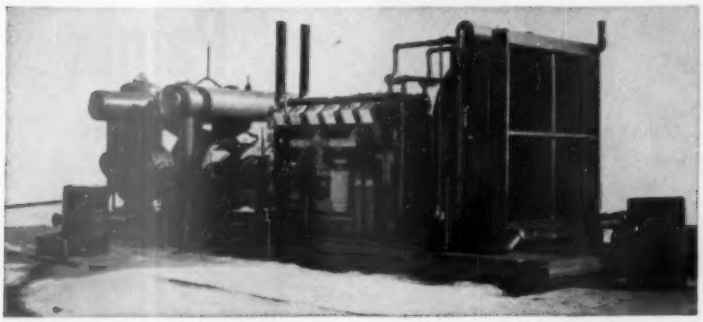
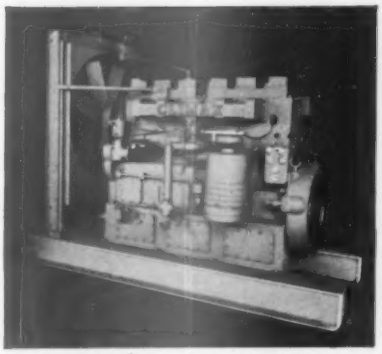
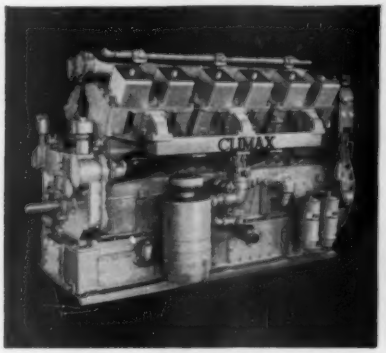
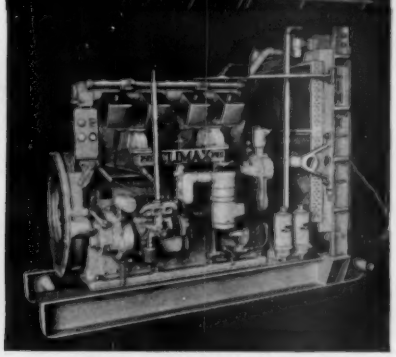




Model K-67—Max. hp 265 (Natural Gas)



Model V-125—Max. hp 605 (Natural Gas)



Model V-85—Max. hp 390 (Natural Gas)

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Model	Bore & Stroke	Displ.	Peak Torque @ RPM	Brake hp at Speeds Indicated					Peak Torque @ RPM	Brake hp at Speeds Indicated			
				600	800	900	1000	1100		800	900	1000	1030
R-165	6⅛ x 7	1238	684 @ 750	81	105	117	127	135	557 @ 800	85	95	103	105
K-67	7 x 7	1616	955 @ 850	110	145	161	176	188	775 @ 800	118	131	143	146
K-75	7½ x 7	1855	1090 @ 800	126	166	185	204	218	885 @ 800	135	151	166	169
V-80	7 x 7	2155	1240 @ 850	140	188	210	230	246	1002 @ 800	153	171	187	190
V-85	7½ x 7	2474	1460 @ 800	164	223	246	266	284	1185 @ 800	181	200	216	221
V-122	7 x 7	3232	1920 @ 800	217	293	328	353	378	1562 @ 800	238	265	288	293
V-125	7½ x 7	3711	2240 @ 850	242	340	384	417	442	1820 @ 900	276	312	340	346

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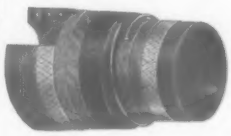

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Petroleum Storage Tank, Clyde Refinery, Photograph by courtesy of The Shell Refining (Australia) Pty. Ltd.

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extension of Smithdale field, the discovery and initial development of this field is following the pattern followed at McComb and in its older sister field at Little Creek. In both of these fields, completion of their respective discovery wells was followed quickly by a succession of long stepouts that proved up sizeable areas early in the lives of these fields and precipitated active drilling programs.

In the case of McComb, it was not long before 25 to 30 rigs were running in the field. Less than a year old, it now has more than 100 wells. Drilling and production lately have had to be greatly curtailed because of lack of market outlets for production. Little Creek, less than 10 miles northeast of McComb, has nearly 150 wells after 2½ years.

The Smithdale and Southeast Smithdale discoveries have marked a significant southwestward extension of Tuscaloosa development into Amite County, previously unproductive except for one small far-removed well. It is more than 20 miles from the Smithdale wells. Their discoveries have led the way to a buildup in wildcat drilling, scattered southwestward across the county, and into the adjoining Florida parishes of Louisiana.

Out of this wildcatting, another Tuscaloosa oil discovery is indicated. It is more than 10 miles southwest of the Smithdale wells where C. F. & H. Oil Co. has been testing its 1 Crosby, in 29-3n-5e. This well is expected to make a small well on the pump after flowing by heads 20 to 30 bbl. per day. Pay is Lower Tuscaloosa, topped at 10,852 ft. (subsea depth), and perforated at 11,284-95 ft. Drilling already is under way on the company's second test to confirm the indicated discovery.

Discovery wells

CALIFORNIA

Humboldt County:

Zephyr Oil Co. Leon Oro Blanco T-1, SE SE 6-3n-1w, 800 M.c.f.d., ⅞-in. choke, perfs. 4,800-10 ft., TD 5,652 ft. Gas discovery 3 miles northwest of Tompkins Hill gas field.

G. E. Kadane & Sons, Maine Prairie 1, Gas Unit A, NW NW 20-6n-2e, no flow released, TD 7,501 ft. New field discovery 2½ miles northwest of Maine Prairie gas field.

LOUISIANA OFFSHORE

Ship Shoal area:

The California Co. 1 OCS-0814, Block 107, Gulf of Mexico. Shut-in oil well waiting potential test, no gage, perf. 10,156-62 ft. TD 10,408 ft. New pay in Ship Shoal Block 107 field.

Vermilion area:

Continental Oil Co. (CATCO) 2 OCS-0487, Block 119, Gulf of Mexico, IP 192 BOPD, 9/64-in., 43.6°, GOR 800 cu. ft. per bbl., TP 1,200 psi., perf.

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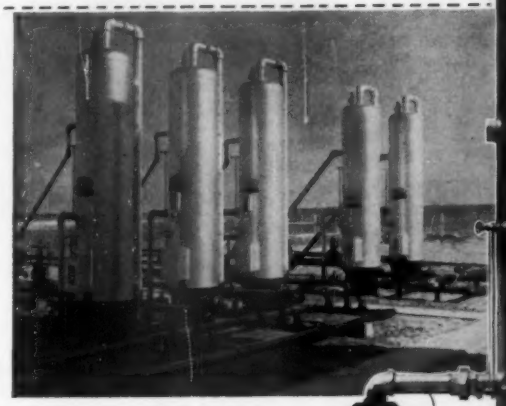
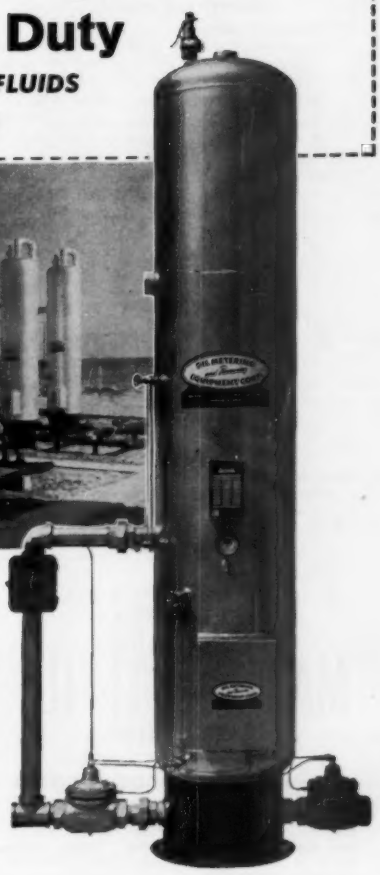


Battery of Model 24MS—0109C Type C Metering Separators



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8,604-12 ft. TD 9,400 ft. New pay in Vermilion Block 120 field.

NORTH LOUISIANA

Claiborne Parish:

Southwest Natural Gas Producing Co. 1 Martha Loving et al. Unit, 16-23n-6w 3½ miles northwest of Colquit. IP 817 M.c.f.d., 63 BC per M.M.c.f., 5/16-in., 62.7°, TP 440 psi., perf. 9,567-83 ft.. Haynesville. TD 11,089 ft. Extends East Haynesville field 1½ miles east.

SOUTH LOUISIANA

Beauregard Parish:

Lyda Hunt-Herbert Trust 1 McPherson Minerals Land Co., 1-6s-8w, ¾ mile northwest of Clear Creek field. IP 142 BOPD, 9/64-in., 48.9°, GOR 574 cu. ft. per bbl., TP 800 psi., perf. 8,672-78 ft. TD 9,200 ft. Extension discovery.

East Baton Rouge Parish:

The California Co. 1 Mrs. Phillip Ferro et al., 45-8s-1e. IP 240 BOPD, 8/64-in., 35.6°, GOR 641 cu. ft. per bbl., TP 1,375 psi., perf. 9,684-97 ft. TD 11,000 ft. New reservoir and extension discovery west of Burtville area.

MICHIGAN

Calhoun County:

McClure Oil Co. and Perry Faulk 1 Winter, NW NE NE 19-2s-4w, Sheridan Township. IP 103 BOPH. Elev. 980 ft., Traverse lime 1,673 ft., Trenton 4,111 ft., loss zone 4,185 ft. TD 4,236 ft. Extends Albion pool 3 miles northwest.

Osceola County:

Robert Bond 1 Van Antwerp, SE SE SE 19-20n-10w. IP 245 BOPD, TD 3,804 ft. Elev. 1,203 ft., Dundee 3,672 ft., pay zone 3,683 ft., Reed City Dolomite 3,772 ft., pay zone 3,802-04 ft. New pay in Reed City pool.

NORTH TEXAS

Montague County:

Bennett Oil Co. 1-A J. B. Irons "A," J. Bradshaw Survey, A-26, 12 miles southwest of Bowie. IP 126 BOPD, 16/64-in., 42°, TP 340 psi., GOR 725 cu. ft. per bbl., perf. 5,653-67 ft. TD 6,704 ft. New pay in Eanes field.

SOUTHWEST TEXAS

Guadalupe County:

C. R. Wilkerson 1 Pleas Anderson, Green De Witt Sur., A-16, 7 miles east of Seguin. IPP 6 BOPD, 28°, perf. 1,060-88 ft., Navarro. TD 1,134 ft. New oil pay in Darst Creek field.

Starr County:

Shell Oil Co. 4 Thomas-Rife et al. Gas Unit, Section 547, CCSD&RGNG Sur., A-384, 24 miles northeast of Rio Grande City. AOF 15,500 M.c.f.d., GLR 22.9 M.c.f. per bbl., 58.1°, perf. 6,986-96 ft., Vicksburg. TD 9,102 ft. New pay in North Rincon field.

Zapata County:

Amerada Petroleum Corp. 1 Haynes Estate, Los Mogotes Grant, 16 miles east of San Ygnacio. AOF 30 M.M.c.f.d., dry gas, shut-in TP 1,238 psi., perf. 2,822-48 ft., 2,854-60 ft., 3,056-75 ft., 3,224-40 ft., 3,382-95 ft., 3,672½-80½ ft., and 4,060-67 ft., Queen City. TD 4,890 ft. New-field discovery.

TEXAS GULF COAST

Brazos County:

Lonnie Holotik 2 P. P. Prescott, Walter Southerland Sur., 4 miles southwest of Millican. AOF 12,300 M.c.f.d.. dry gas, shut-in TP 1,447 psi., perf. 3,414½-17½ ft., Wilcox. TD 3,500 ft. Discovery well of West Millican field.

Calhoun County:

Humble Oil & Refining Co. 1-B Florence M. Trull, Section 41, Theodore F. Koch Subd., James Hughson Sur., A-23, 8 miles northeast of Olivia. AOF 48 M.M.c.f.d., 29.89 BC per M.M.c.f., 48.1°, shut-in TP 5,240 psi., perf. 8,235-38 ft.. Frio. TD 8,750 ft. Discovery well of Southeast Appling field.

Goliad County:

Glen A. Martin, Edwin L. Cox, and Parker Oil & Gas Co. 1 P. H. Breeden, Joseph Simmons Sur., A-253, 1 mile south of Weesatche. IP 11,800 M.c.f.d., GLR 29.6 M.c.f. per bbl., 60.9°, shut-in TP 2,577 psi., perf. 8,105-17 ft., Machank sand. TD 8,310 ft. New-field discovery (Breeden).

WEST CENTRAL TEXAS

Coleman County:

Henderson & Henderson 1 Mrs. Gussie Wise, 3½ miles northeast of Rockwood on Buenita Alderata Sur. 273. IPF 2,200 M.c.f.d., ½-in. choke, pay 616-626 ft. TD 650 ft. New gas discovery.

Haskell County:

Katz Oil Co. 1 Ancel Waldrip, 1 mile northeast of O'Brien in Sec. 246, Blk. 45, H&TC Sur. IPP 126 BOPD, 3% b.s. and w., 38.4°, Strawn 4,913-16 ft. TD 4,920 ft. New oil discovery.

Taylor County:

Callihan Int. Inc. 1 R. E. Dillard (was Elliott-King), 4½ miles northwest of Tuscola in Sec. 7, Blk. 3, SPRR Sur. IPP 33 BOPD, 40% water, Flippen 2,408-13 ft. TD 2,552 ft.

WEST TEXAS

Crosby County:

William Ridley Wheeler Estate, 2-C Clark Wood, 10 miles east of Slaton in Sec. 16, Blk. B-9, EL&RR Sur. IPP 41.66 BOPD, 50% water, 36.4°, GOR 275:1, Glorieta 3,764-71 ft. TD 4,038 ft. New oil discovery.

Culberson County:

George L. Vlassis 1 Honolulu-State, 10 miles southwest of Orla in Sec. 3, Blk. 45, PSL Sur. IPF 126 BOPD, 16/64-in. choke, 38°, GOR 450:1, TP 300 psi., CP 300 psi. Permian 1,218-24 and 1,279-85 ft. TD 1,400 ft. New oil discovery.

Palo Pinto County:

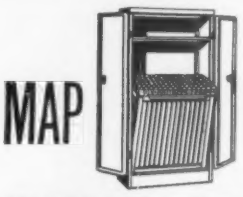
Texas Pacific Coal & Oil Co. 7-X Thomas Court Fee, Thomas Court Sur., 2½ miles northwest of Strawn. IP 9 BOPD, 1,020 M.c.f.d., 27/64-in. choke, TP 260 psi., perf. 3,156-63 ft. TD 3,533 ft. New-pool discovery.

Taylor County:

Jake L. Hamon 1 Lail Estate, Section 151, Block 64, H&TC Sur., 30 miles southwest of Abilene. IPP 23.37 BOPD (net), 75% water, 41°, perf. 4,202-6 ft. TD 4,654 ft. New-pool discovery.

LEGAL

SEALED BIDS will be received until 2:00 P. M., July 7, 1960, Pacific Standard Time, and opened at that time in the office of the Western Washington Indian Agency, Everett, Washington, for the leasing of 2005.69 acres of allotted Indian land, located in Township 30 North, Ranges 4 and 5 East, Snohomish County, Washington, for oil and gas mining purposes. The details of the lease offering and how and where to file bids may be obtained by addressing the enquiry to the Superintendent of the Western Washington Indian Agency, at 1620 Hewitt Avenue, Everett, Washington.



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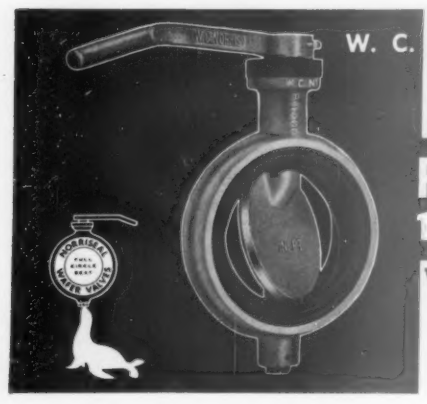

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VALVES

H. D. Moore . . . crude-price cut was the only answer.

Marketing Profits Big Worry

. . . for Derby president, who feels everyone will be loser unless the refiner gets a fair margin on his products.

H. D. (IKE) MOORE barely had taken over as president when Derby Refining Co. and oil producers became embroiled in a historic struggle over the price of Central Kansas crude.

Moore, whose business philosophy is based solidly on a spirit of industry cooperation, already is looking to the days ahead when the current price trouble will finally be settled. He says that many segments of the oil business meanwhile must revise their basic thinking if this is to remain a healthy and prosperous industry.

The big lesson for oil men, he adds, is that unless a fair profit is made on refined products, everyone will ultimately be the loser.

Moore has spent many years in all phases of the oil business, both with independent and major companies, and as a result he does not point criticism at any one branch of the industry. He feels, however, that:

. . . **Majors** and independents must give more study to marketing. They have cooperated for years in joint exploration deals, in production, in necessary exchanges of crude and products. But in marketing, cut-throat practices have made a shambles of profits.

. . . **Price protection** by some companies for their dealers in price-war situations should be stopped. Moore feels this practice actually has contributed to price cutting and often prolongs wars once they're started.

. . . **Producers** must come to realize they will have to share with refiners the losses felt when product markets decline. The days have gone when refiners can economically hold a price umbrella over producers and absorb all the losses at the pump.

During the first quarter of 1960, Derby received an average price for refined products that reflected a 50-cent a barrel decline in its income. At the same time crude prices remained at the same level and were isolated entirely from the declining market price.

"We cut our costs every place we could, and we finally decided lower crude prices were the only answer to keeping Derby healthy and thereby preserving this market for Kansas crude producers," he said.

Moore feels the industry can work out its problems if majors and independents, refiners and producers, show business statesmanship and more cooperation.

"It's really time we all realized we're in the same boat."

Moore is a man-in-a-hurry these days, spending as much as 14 hours at his desk, getting acquainted with details of Derby operations, and infusing his organization with his ambitious program for the well-regarded, pioneer Kansas company.

He came to Derby from a job as vice president and executive assistant to the president of Sinclair Oil Corp., New York. With Sinclair he was prime coordinator of pipelines and crude-oil purchasing.

Moore joined Sinclair in 1950 when that company acquired Wood River Oil & Refining Co. of Wichita, Kans. He held marketing posts for Sinclair in New York and Kansas City before being made a vice president in 1957.

Moore, 49, grew up in oil country around Electra and Vernon, Tex., and first got into the oil business with the W. T. Waggoner Estate empire in North Texas. Over a 17-year period he did a little of everything, working in production, natural gasoline, pipeline, refining, marketing, and accounting before being promoted to the executive department.

During his days with the Waggoner interests. Moore became a close friend and associate of Secretary of Treasury R. B. Anderson, who for many years was directing manager of the estate's oil interests.

Moore met his wife, Eloise, in grade school. They have two sons, Phil, a student at Texas Christian University, and Mike, who is attending school in Greenwich, Conn.

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Marcel A. Baur, manager of Mobil Oil A.O., West African marketing subsidiary of Mobil International Oil Co., will retire July 1. Baur joined the Mobil companies in 1925. He will be succeeded in Dakar, West Africa, by **Roland M. Rieutort.**

R. G. Edgerton, formerly assistant professor of petroleum engineering at the University of Texas, has joined Forest Oil Corp. as reservoir engineer in Casey, Ill.

Jack J. Cinque, group leader with American Oil Co. in Texas City, has joined Texas Butadiene & Chemical Corp. as process engineer in Channelview, Tex.

▶▶▶ Personals

James E. Finley, southwestern region exploration manager in Fort Worth for Continental Oil Co., has been appointed Rocky Mountain region exploration manager. He will headquarter in Denver. **Clarence B. Round,** assistant superintendent of Conoco's Ponca City, Okla., refinery,

FINLEY

ROUND

has been named manager of manufacturing for the Rocky Mountain region. He succeeds **W. F. Brown,** recently transferred to Houston as special assistant to the senior vice president. Finley had been Midland, Tex., division geophysicist and division exploration manager before moving to Fort Worth in 1957 as assistant regional exploration manager and later as regional exploration manager. Round was assistant to the vice president in charge of manufacturing before being named assistant superintendent of the Ponca City refinery in 1954.

Douglas S. Estes, formerly with Texas City Refining, Inc., has been named assistant to the general manager at Kaneb Pipe Line Co.'s El Dorado, Kans., operating headquarters.

Robert O. Anderson, president of Hondo Oil & Gas Co., Roswell, N. M., has been elected a director of Northern Natural Gas Co. He succeeds **Fred C. Koch,** Wichita, who has resigned as a director.

Len Moody, associate director of Esso Research & Engineering Co.'s products research division, has been given a one-year rotational assignment in Houston as assistant manager of research for Humble Oil & Refining Co. His main responsibility will be coordination of research in product quality, specialties, additives, and marketing. Moody has been associate director of products research for Esso Research since 1957.

Dr. Edward F. Gurnee, physical chemist in Dow Chemical Co.'s physical research laboratory, has been promoted to associate scientist. Gurnee has done extensive work with mechanical and optical properties of polymers.

Ray Harrison, Cardinal Petroleum Co., Bismarck, has been elected president of the North Dakota Independent Oilmen and Landowners Association. **Arthur Seay,** Bismarck independent, has been named vice president with **Leroy Blaylock,** Bismarck, as secretary-treasurer. Named directors were **Charles Donlin,** Kelsch & Donlin, outgoing president; **Kye Trout,** Little Missouri Minerals; **Pat Ballantyne,** Great American Exploration; **George Summers,** Summers, Mueller & Dyer; **Paul Kelly,** Calvert Petroleum; **Kneelan Teague,** consultant; **Tom Voorhees,** Cardinal Petroleum; **Herb Officer,** North American Royalties; **Steven Harris,** Harris & Brown; **Leonard Ward,** Ward Williston Drilling; **Clyde Jones,** Bismarck; **Howard Henry,** Westhope, N. D.; **Norman Jessen,** Powers Lake, N. D.; **Harry Berg,** Great Plains Royalty Corp.; and **Irvin Wilhite,** Star Drilling.

Steve Wythe, head of Esso Research & Engineering Co.'s additives section, products research, is on loan assignment with Humble Oil & Refining Co.'s Esso Standard division. He will head the additives plant at Esso's Bayway refinery, Linden, N. J. **Lee Shore** will be acting head of the additives section, succeeding Wythe.

Harold W. Fisher, a director of Standard Oil Co. (N. J.), has been named a contact director on the Jersey board for Esso Research & Engineering Co., succeeding **Marion W. Boyer.** Boyer recently was elected a vice president of Jersey Standard and named chairman of a new investment advisory committee. Fisher has been with the Jersey companies since 1927. He has been coordinator of Jersey's worldwide refining activities, shareholder representative for the United Kingdom, and chairman of the coordination committee for Europe.

C. Howard Adams, manager of of plastics development in Monsanto Chemical Co.'s research and engineering division in St. Louis, has been appointed a senior engineering supervisor in the plastics division. At Monsanto's Springfield, Mass., plant, **Costas H. Basdekis, Dr. O. Paul Cohen, Dr. Manuel F. Drumm, George W. Ingle,** and **Q. A. Trementozzi** have been appointed assistant research directors in the plastics division. Basdekis, a senior group leader, will be an assistant research director for polystyrene. Cohen will be an assistant director for polyvinyl chloride; Drumm, for plastics processing; Ingle, for polymer properties and standards; and Trementozzi, for polymer activities. Cohen, Drumm, Ingle, and Trementozzi were formerly research section leaders. **Leo P. Paradis,** research chemist at Springfield, has been appointed group leader of the polystyrene product development group there. **Alfred P. Brackney** has joined the Springfield plant's engineering department, plastics division. **Victor A. Matonis** has joined the research department and **James A. Miller** has joined the sales department.

Dr. Stanley L. Grotch has joined Shell Development Co.'s Emeryville, Calif., research center as engineer in the chemical engineering department.

William F. Kenney, vice president and general counsel of Shell Oil Co., has been elected chairman of American Petroleum Institute's committee on public affairs. He will succeed **Kerryn King,** vice president of Texaco Inc., July 1.

Dr. Charles W. Perry, Kendall Refining Co., has been cited for outstanding professional achievement by Northeastern University, Boston. Perry is a graduate of the school.

C. J. Hedlund, manager of the coordination and petroleum economics department of Standard Oil Co. (N.J.), will become a vice president and director of Esso Italiana with headquarters in Genoa August 1. He will be succeeded by **George T. Piercy,** assistant manager of the department.

HEDLUND

PIERCY

In other Esso Italiana changes: **Alessandro Zatti,** a director, has been named vice president. **R. T. Bonn,** now with Esso Export Corp., has been named a director succeeding **E. G. Broming,** who will return to Jersey Standard. **L. Pittaluga,** assistant comptroller, has been named comptroller. He succeeds **D. J. Thompson,** who will become a director of Esso Switzerland. Helund had been manager of petroleum economics for Jersey Standard since 1954. Piercy was named assistant manager of the department in 1958.

▶▶▶ Personals

G. R. Brainard, Jr., vice president of Drilling & Exploration Co., Inc., Dallas, has been elected executive vice president of the company.

Don F. Ferguson, formerly sales manager for Refinery Engineering Co., has joined Hydrocarbon Construction Co., Houston, as vice president in charge of the petroleum refinery division. He will headquarter in Houston.

Adolph F. Schlachter has joined the chemical sales staff of Delhi-Taylor Oil Corp. in New York.

Warren C. Lothrop and **Howard O. McMahon** have been promoted to senior vice presidents of Arthur D. Little, Inc. Lothrop will continue as director of the research and development division. McMahon will continue to head advanced research for the company.

Jack Moar, general manager and a director of Canadian Kodiak Refineries, Ltd., has been elected vice president in charge of operations. **W. N. Grace,** secretary-treasurer of Canadian Chieftain Petroleums, Ltd., has been named secretary of Canadian Kodiak.

W. C. Whaley, Tulsa, chairman of the executive committee of Sunray Mid-Continent Oil Co., and **Paul Endacott,** Bartlesville, Okla., president of Phillips Petroleum Co., have been named to the Department of Interior's new wildlife conservation liaison committee.

William A. Gorman, Royal Oil & Gas Corp., has been elected president of Houston Geological Society. He succeeds **Edd R. Turner, Jr.,** Tidewater Oil Co. Other new officers are **Philip R. Allin,** Union Texas Natural Gas Corp., first vice president; **Austin D. Brixey, Jr.,** Sinclair Oil & Gas Co., second vice president; **Clark Edgecomb, Jr.,** Schlumberger Well Surveying Corp., secretary; and **Thomas M. Burke,** John Mecom interests, treasurer.

Dr. D. S. Laity has been appointed group supervisor, process and plant design section, at the Richmond, Calif., laboratory of California Research Corp.

John A. Cathey has been named chief geophysicist for Monsanto Chemical Co.'s Lion Oil division. He will headquarter in Houston. Cathey was chief geophysicist for the Colombian division of Texas Petroleum Co. before joining Lion. He also was chief geophysicist and assistant exploration manager for Seaboard Oil Co. at one time.

W. E. Bryan, gas engineer with Texaco Inc., has been transferred to Houston from Denver.

John M. Crawford and **Dr. Warren L. Jensen** have been named assistant managers of Continental Oil Co.'s research and development department. Crawford will be responsible for production, exploration, and central research divisions. Jensen will be in charge of petrochemical research, petroleum products, and research services divisions. **W. E. N. Doty,** supervising research geophysicist, will succeed Crawford as director of the exploration research division. **James C. Kirk,** director of research for Petroleum Chemicals, Inc., an affiliate, in Lake Charles, La., will succeed Jensen as director of petrochemical research.

John D. Lyle, Gordon Talk, and **Bennie C. Sinclair,** assistant petroleum engineers for Union Producing Co., have been promoted to petroleum engineers. Lyle will be located in Houma, La., Talk, in Houston, and Sinclair in Jackson, Miss. **Robert A. F. Hill,** assistant petroleum engineer, has been transferred to McAllen, Tex., from Beeville, Tex. **Harvey L. Gold,** assistant petroleum engineer in Shreveport, La., has moved to Beeville.

G. B. Oates, mud engineer for Shell Oil Co., has been named Houston area mud engineer. **L. C. Stipp, Jr.,** exploitation engineer, has been transferred to Corpus Christi, Tex., from Houston.

I. C. Anderson has been elected a vice president of Creole Petroleum Corp. He succeeds **D. E. Stines,** who recently was named executive assistant to the chairman of Standard Oil Co. (N. J.). Anderson will continue as manager of export sales for Creole.

John Grosso has rejoined Sinclair Oil & Gas Co. as petroleum engineer in the Tulsa reservoir engineering section. Grosso was with Sinclair in Midland, Tex., before taking military leave of absence.

Dr. M. W. Leighton, geological research section head in Jersey Production Research Co.'s geological division, Tulsa, has been given a temporary assignment with Esso Standard (Libya) in Tripoli. **Dr. C. C. Rix** will be acting section head for one of Jersey Production's three geological research sections during Leighton's absence.

Robert B. Chapman, assistant manager of Jersey Production Research Co.'s production-research division in Tulsa, is being transferred to the New York office of Standard Oil Co. (N.J.), in the producing - economics section, producing-coordination department. He will work with analysis of world-wide aspects of costs, profits, and investment opportunities. The appointment is effective September 1. Chapman was area engineer for Carter Oil Co. in Oklahoma City before moving to Jersey Production's Tulsa research center in 1957.

Paul Taylor, maintenance superintendent of Chemstrand Corp.'s Decatur, Ala., acrylic-fiber plant, has been named utilities superintendent. **John C. Cole** has been named design and control superintendent. **Walter D. Smith,** construction engineer, will succeed Taylor as maintenance superintendent.

J. S. Compton, assistant to the chief land man of Kewanee Oil Co. in Tulsa, has been promoted to chief land man, exploration department. Compton joined Kewanee in 1956. He succeeds **T. G. Costakis,** who was named manager of exploration earlier this year.

Fred C. Himes has joined the research department of Monsanto Chemical Co.'s Lion Oil division in Texas City.

John L. Latimer, senior vice president of Mobil Oil Co., has been awarded an honorary doctor of science degree by St. Bonaventure University.

L. F. McCollum, president of Continental Oil Co., has been awarded an honorary doctor of laws degree from Texas Technological College, Lubbock, Tex. McCollum was commencement speaker at Texas Tech.

T. H. Acres, division engineer for Sunray Mid-Continent Oil Co., has been transferred to Denver from Los Angeles. His move is part of consolidation of the Rocky Mountain and West Coast divisions to form the western division.

Edward M. Connaughton, senior economist with Socony Mobil Oil Co.,

Personals

has been given a special assignment with National Iranian Oil Co. working with reorganization of the economics department. He will return to Socony in New York in September.

W. S. Schellentrager, process coordinator for Standard Oil Co. (Ohio) in the engineering division of the manufacturing department, Cleveland, has been given a temporary assignment as project manager for the ammonia and urea plant planned by Solar Nitrogen Chemicals, Inc., in Joplin, Mo. Schellentrager will be chairman of the Solar Joplin engineering committee. Other committee members are **L. T. Marks,** Atlas Powder Co., and **D. C. Stoll,** chief engineer in Ohio Standard's petrochemical department. Atlas Powder and Ohio Standard are joint owners of Solar Nitrogen. **John J. Graham,** supervisor of engineering service section for Ohio Standard, will take over as process coordinator while Schellentrager is on special assignment. **Wilbur L. Moran,** maintenance superintendent at the No. 2 Cleveland refinery, will succeed Graham. **Victor D. Filimon,** section supervisor on the operations staff, will replace Moran.

Daniel B. Lovejoy, senior vice president of Union Texas Natural Gas Corp., has been elected a director of the company.

Dr. R. E. Jentoft has been named senior research chemist in the analytical and physical measurements section of California Research Corp.'s Richmond, Calif., laboratory.

Dr. Christiaan P. Van Dijk has been named research associate in M. W. Kellogg Co.'s Jersey City, N. J., laboratories. He will work in the exploratory research group. Van Dijk was with Dow Chemical Co. before joining Kellogg.

Virgil R. Johnson has been named a research associate by Jersey Production Research Co. He will continue to work with fundamental geophysical research on oil-exploration methods. Johnson has been with Jersey Production in Tulsa since 1956.

Thomas M. Hendrickson has joined Monsanto Chemical Co.'s Lion Oil division as geologist in the New Orleans district. He was with Fish Northwest Constructors before joining Lion.

Alfred W. Weitkamp, research associate in the Whiting, Ind., laboratories of Standard Oil Co. (Ind.), has received an honorary doctor of science degree from Midland College, Fremont, Neb. Weitkamp was named one of the 10 most able chemists in the field of fats, oils, and soaps in 1947.

J. F. Courtney, district production superintendent for Shell Oil Co. in Quitman, Tex., has been transferred to Kilgore, Tex., in the same capacity. **W. A. Fletcher,** production foreman in Quitman, has been transferred to Kilgore. **K. W. Bunte,** mechanical engineer, and **H. J. Ritch,** exploitation engineer, have been transferred to Quitman from Kilgore. **K. C. Williams,** exploitation engineer in Quitman, has been transferred to the Houston division.

Grady U. Isbell has been named operations manager for Gulf Italia Co., Gulf Oil Corp.'s Italian subsidiary. Isbell succeeds **Bart J. Aimone,** now general manager of Gulf's Spanish affiliate.

Clive G. McKnight, Jr., staff land man for Monsanto Chemical Co.'s Lion Oil Co. division in Denver, has joined Murphy Oil Co. of Oklahoma, Inc., as land manager. He will headquarter in Tulsa.

D. R. Zachry has been elected president of Delta Refining Co., Dallas. He succeeds **E. Constantin, Jr.,** who has moved up to chairman. Zachry recently resigned as executive vice president of American Petrofina Co. of Texas. He was executive vice president of American Liberty Oil Co. before it was purchased by Petrofina in 1957. Zachry will headquarter in Dallas.

Latham L. Brundred, Jr., American Climax Petroleum Corp., New York, has been elected 1960-61 chairman of the New York section of AIME's Society of Petroleum Engineers. Other new officers are **Bryant C. Frihart,** Cities Service Co., first vice chairman; **Joseph J. Johnston,** Arabian American Oil Co., second vice chairman; **Gerald E. Sherrod,** First National City Bank, secretary; **Charles R. Brown,** Magnet Cove Barium Corp., treasurer. Members of the executive committee are **W. Boyd McCoy,** Halliburton Oil Well Cementing Co.; **Shannon L. Matheny, Jr.,** Ideco; **Robert M. Blackbill,** Shell Oil Co.; **Larry E. Hess,** Mobil International Oil Co.; **Roy H. Smith,** Pan American International Oil Co.; and **G. Dawson Priestman,** Standard Oil Co. (N. J.).

William R. Banks, production superintendent for Ambassador Oil Corp. in Oklahoma City, has been transferred to Abilene, Tex., as production superintendent. **David T. Kiester,** Abilene, has been named production superintendent in the company's new Denver division office. **Harold Burke** will succeed Banks in the Oklahoma City division.

Deaths

Herbert J. Weeks, 62, geological counselor to Sun Oil Co.'s foreign-operations department and vice president of nine Sun subsidiary companies engaged in foreign exploration and production, died June 11. Weeks had been with Sun since 1923. He was with both the Wisconsin and Colorado geological surveys before that time.

Raymond A. Skeehan, 67, retired accounting supervisor for Sunray Mid-Continent Oil Co., died June 14 at his home in Tulsa.

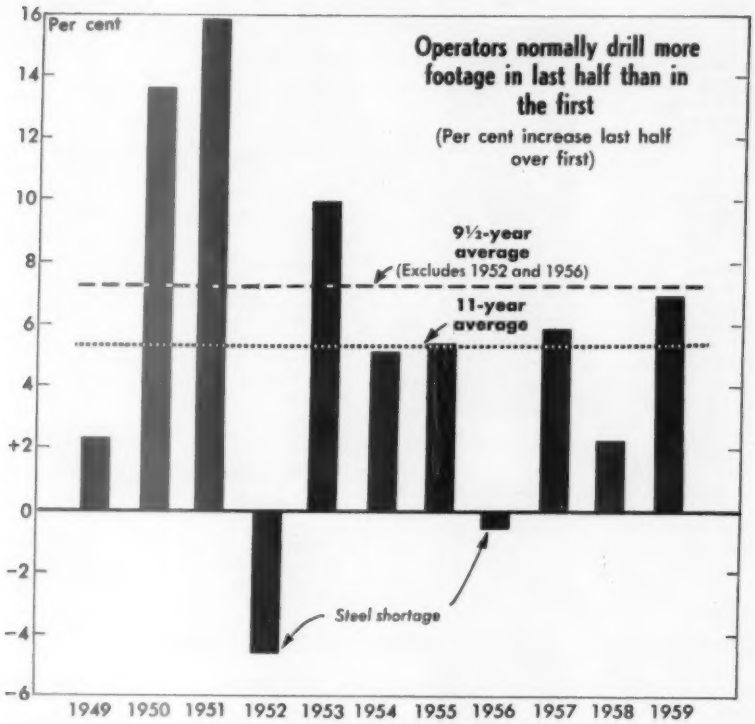
Thomas G. Workman, 60, retired superintendent with Wolf's Head Oil Refining Co., Inc., died June 10 in an Oil City, Pa., hospital. Workman retired in 1954.

William H. Kearney, Sr., retired chief inspector for United Gas Pipe Line Co., died June 7 at his home in Salamanca, N. Y. Kearney was division pipeline superintendent, district superintendent, and district manager for the company in Houston before being named chief inspector in 1945. He retired in 1946.

Thomas J. Hanlon, 76, retired general attorney for Sinclair Pipe Line Co., died June 8 at his home in Independence, Kans. Hanlon retired in 1950 after 30 years with the Sinclair companies.

Thomas H. Kerr, research associate professor in chemical engineering at Ohio State University and former vice president and a director of Ohio Fuel Gas Co., died May 27 at his home in Columbus, Ohio. He had been ill for several years.

Norman V. Kinsey, Sr., 66, Shreveport, La., independent producer, died June 5 in a New York hospital after a brief illness. Kinsey was a director of Transcontinental Gas Pipeline Corp. and a former director of Texas Illinois Natural Gas Pipeline Co., Pacific Northwest Pipeline Corp., and Spokane Gas & Fuel Corp. He was a former vice chairman of the Interstate Oil Compact Commission.



Drilling will be up in last half, but how much?

BY JOHN C. CASPER

DRILLING THIS YEAR has been at the lowest rate since 1953. The big question is, "What will happen in the last half?" You may be able to get some idea of last-half activity from records of past years. At least, these records should help establish probable limits on total footage for the year.

The chart gives a comparison of first-half and last-half drilling since the end of World War II. Each bar represents the per cent increase in footage, last half over first half.

Note that there have been only 2 years out of the 11-year period with a decrease in footage in the last half. One decrease was in 1952 and the other in 1956. Both losses were influenced by a shortage of steel.

The chart establishes this fact: If conditions are anywhere near normal, operators will drill more footage in the last half than in the first.

The average for the full 11-year period, including the steel-shortage years, shows last-half footage up 5.25% over the first half. If the two steel-shortage years are excluded, the last-half increase is 7.23%.

The tallest bar indicates that operators drilled almost 16% more footage in the last half of 1951 than in the first half. Also, note that the ratio for 1959 was about the same as the 9-year average.

Final records of first-half drilling won't be available until after the first of July, but the general trend indicates a total of about 21,700 wells for the first 6 months.

The average well so far this year has been 4,384 ft. deep. This average should hold at least for the remaining weeks of the first half.

A total of 21,700 wells, averaging 4,384 ft. each, accounts for about 95,000,000 ft. in the first half. This total in combination with past trends supplies information on the probable range of drilling for the year.

Here are the several conditions:

1. Last-half percentage gain in drilling will equal the 11-year average. On this basis, drilling for the last half would top 100,000,000 ft. Total for the year would add up to slightly more than 195,000,000 ft. This total probably is the lower limit for the year.

2. Last-half percentage increase will equal the 9-year average. On this basis, another 2,000,000 ft. would be added to give 197,000,000 ft. for the year.

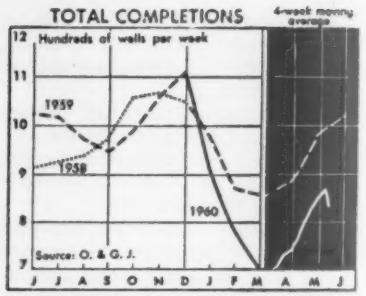
3. Last-half footage will be up to the 108,000,000 ft. drilled in the last 6 months of 1959. If drillers cut that much hole, the total for the year will climb to almost 203,000,000 ft. This total probably is the upper limit of drilling for this year.

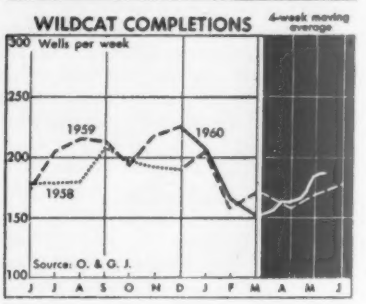
The figures indicate a range from 185,000,000 to 203,000,000 ft. for the year. Even the larger total falls below the January forecast which was based on operators' reports of plans at that time.

Replies from the midyear survey will be coming in soon. Changes in operators' drilling plans will be reflected in the Journal's revised forecast which will be carried in the July 25 issue.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,775,000	DOWN	35,000	DOWN	225,000
Crude stocks	259,272,000	DOWN	142,000	DOWN	2,459,000
Completions	766	DOWN	109	DOWN	251
Refinery runs	7,836,000	DOWN	125,000	DOWN	184,000
Gasoline stocks	207,935,000	DOWN	1,973,000	UP	6,427,000
Kerosine stocks	25,788,000	UP	771,000	DOWN	363,000
Distillate stocks	101,123,000	UP	4,456,000	DOWN	5,382,000
Residual stocks	40,394,000	UP	661,000	DOWN	14,218,000
Four-product stocks	375,240,000	UP	3,915,000	DOWN	13,536,000
Total imports	1,654,400	UP	17,000	UP	436,800





Active Rotary Rigs

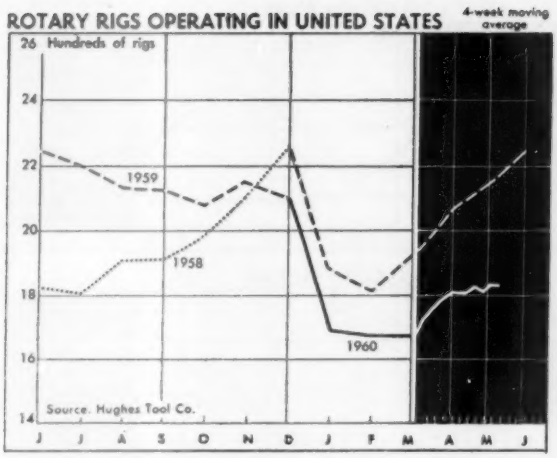
	6-13-60	6-6-60	6-15-59
Alabama	4	3	7
Alaska	4	4	(†)
Arkansas	13	14	9
Arizona	1	1	3
California	82	84	103
Land	76	79	98
Offshore	6	5	5
Colorado	22	32	56
Florida	2	2	2
Land	2	2	1
Offshore	0	0	1
Illinois	44	42	53
Indiana	11	7	7
Iowa	0	0	3
Kansas	109	121	149
Kentucky	8	5	7
Louisiana	291	291	371
North	44	41	33
S. Inland waters	107	117	156
S. Land	86	79	129
Offshore	54	54	53
Maryland	0	0	0
Michigan	45	40	26
Mississippi	59	59	67
Missouri	1	3	1
Montana	22	22	21
Nebraska	25	25	30
Nevada	0	0	1
New Mexico	122	127	138
New York	0	0	1
North Dakota	16	18	39
Ohio	6	6	2
Oklahoma	173	187	248
Oregon	0	1	0
Pennsylvania	14	14	11
South Dakota	0	1	2
Texas	609	638	791
S. Inland waters	6	6	4
S. Land	176	182	204
Offshore	1	2	1
North	51	48	168
Panhandle	41	48	(*)
East	67	60	(*)
West Central	162	176	252
West	105	116	162
Utah	31	31	30
Washington	0	0	1
West Virginia	5	4	8
Wyoming	58	65	93
Total U. S.	1,777	1,847	2,280
Western Canada	156	133	156
Eastern Canada	2	2	0
Grand total	1,935	1,982	2,436

Hughes Tool Co. report. *Included in North. Comparisons not available due to change in method of reporting. †Data first reported 4-4-60.

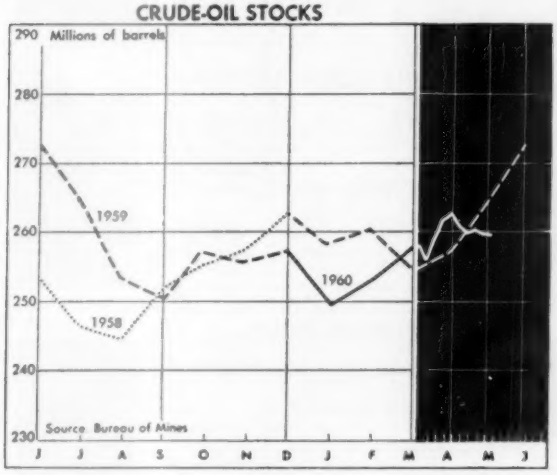
WEEKLY WELL COMPLETIONS . . . WEEK ENDED JUNE 11, 1960

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1960	1959	Total	Crude	Cond.	Gas	Dry	1960	1959
Alabama	1	1	0	0	0	0	11,539	23	46	0	0	0	0	0	1	8
Arizona	0	0	0	0	0	0	0	7	.....	0	0	0	0	0	7	.....
Arkansas	12	7	0	0	5	0	43,533	271	371	8	4	0	0	4	73	60
California	26	15	0	2	9	0	102,706	595	678	5	0	0	0	5	131	163
Colorado	7	1	0	1	5	0	34,284	280	326	3	0	0	0	3	133	193
Illinois	32	18	0	0	14	0	72,396	863	928	3	0	0	0	3	200	154
Indiana	20	8	0	0	12	0	26,469	411	323	7	1	0	0	6	161	107
Kansas	68	34	0	0	31	3	236,933	1,447	1,790	21	1	0	0	20	480	395
Kentucky	40	18	0	2	19	1	51,611	725	957	5	0	0	0	5	86	72
Louisiana	65	31	6	7	21	0	487,647	1,487	1,584	10	1	0	1	8	219	194
North	25	12	0	7	6	0	85,603	489	573	6	1	0	1	4	94	80
South	33	14	6	0	13	0	339,375	756	837	3	0	0	0	3	109	107
Offshore	7	5	0	0	2	0	62,669	242	174	1	0	0	0	1	16	7
Michigan	19	10	0	0	9	0	70,487	328	258	7	0	0	0	7	101	58
Mississippi	18	5	0	0	13	0	177,869	332	283	11	0	0	0	11	116	130
Montana	8	3	0	0	5	0	46,710	116	128	5	0	0	0	5	54	46
Nebraska	13	3	0	0	10	0	67,247	354	355	7	0	0	0	7	135	160
New Mexico	42	18	5	6	13	0	205,521	811	829	3	0	0	0	3	114	92
West	14	3	4	6	1	0	61,730	262	362	0	0	0	0	0	22	27
East	28	15	1	0	12	0	143,791	549	467	3	0	0	0	3	92	65
New York	0	0	0	0	0	0	0	144	143	0	0	0	0	0	7	13
North Dakota	5	4	0	0	1	0	34,102	135	223	1	0	0	0	1	30	45
Ohio	0	0	0	0	0	0	0	439	424	0	0	0	0	0	24	10
Oklahoma	90	39	2	11	36	2	396,346	1,743	2,611	25	5	1	0	19	341	398
Pennsylvania	0	0	0	0	0	0	0	246	212	0	0	0	0	0	7	3
South Dakota	0	0	0	0	0	0	0	15	.....	0	0	0	0	0	6	.....
Texas	277	157	8	5	102	5	1,177,767	7,131	8,597	47	2	0	1	44	1,424	1,605
Dist. 1	16	9	0	0	7	0	52,552	483	513	5	1	0	0	4	169	145
Dist. 2	17	2	3	1	11	0	123,738	343	361	5	0	0	0	5	81	98
Dist. 3	16	8	1	0	7	0	100,948	546	506	2	0	0	0	2	100	110
Dist. 4	13	2	3	0	8	0	78,100	498	591	7	0	0	0	7	146	149
East	30	20	1	0	9	0	139,778	551	501	4	0	0	0	4	115	103
Dist. 7-B	41	20	0	0	21	0	110,921	1,036	1,194	13	1	0	0	12	254	321
West	80	58	0	1	20	1	383,090	1,900	2,695	5	0	0	0	5	297	337
Dist. 9	51	28	0	1	18	4	113,175	1,337	1,626	5	0	0	0	5	193	289
Dist. 10	13	10	0	2	1	0	75,465	437	610	1	0	0	1	0	29	53
Utah	3	3	0	0	0	0	17,273	127	156	0	0	0	0	0	44	43
West Virginia	0	0	0	0	0	0	0	322	327	0	0	0	0	0	4	9
Wyoming	16	7	0	0	9	0	77,599	430	374	7	0	0	0	7	185	120
Misc. (Alaska)	4	1	0	1	2	0	49,862	45	43	2	0	0	0	2	41	28
Total U. S.	766	383	21	35	316	11	3,387,901	18,827	21,966	177	14	1	2	160	4,124	4,106
Previous week	875	428	30	55	335	27	3,726,738	.....	.....	182	22	4	8	148	.....	.....
Cum. 1960	18,827	8,907	595	1,500	7,294	531	82,566,446	.....	.....	4,124	378	46	136	3,564	.....	.....
Cum. 1959	21,966	11,186	552	1,575	8,071	582	91,428,843	.....	.....	4,106	406	60	123	3,517	.....	.....
Western Canada	19	15	0	0	4	0	95,449	934	1,077	4	0	0	0	4	272	360

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	6-4-60	5-28-60	6-6-59
Pennsylvania	2,148	2,145	2,491
Other Appalachian	1,801	1,827	1,782
Illinois, Indiana, Michigan	10,142	9,946	9,654
Nebraska and North Dakota	2,845	2,791	2,800
Kansas	9,607	9,817	9,982
Oklahoma	17,739	17,583	17,049
Arkansas	1,957	1,967	1,822
Louisiana	20,440	19,920	18,697
North	3,466	3,471	3,221
South	16,974	16,449	15,476
Mississippi, Alabama, Florida	2,059	2,050	2,260
New Mexico	8,046	7,799	8,064
Texas	108,273	110,211	114,034
East Texas	8,523	8,967	9,085
West Texas	48,965	49,717	54,937
Texas Gulf	19,068	19,344	18,385
Other Texas	31,717	32,183	31,627
Wyoming	17,944	17,718	16,427
Other Rocky Mountain	10,290	10,382	9,085
California	29,292	29,016	32,360
Foreign	†16,689	16,483	15,224
Total	**259,272**	259,655	261,731

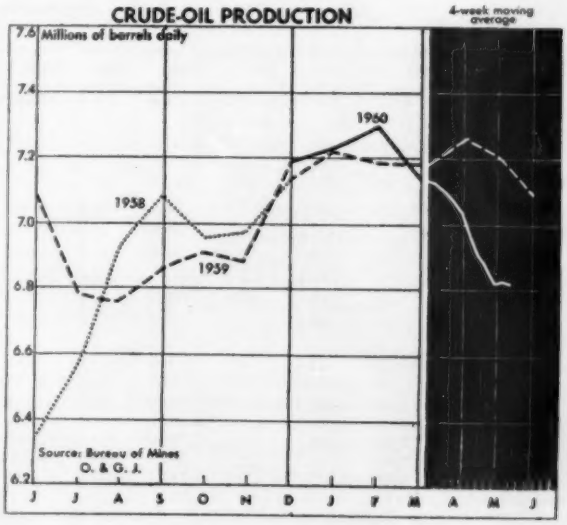
*Bureau of Mines. †Includes 4,499,000 bbl. in California.

DAILY AVERAGE PRODUCTION FOR WEEK

	June 11, 1960 — Crude oil	Lease condensate	Total	June 4 total
Alabama	18,000	.....	18,000	17,900
Arkansas	77,075	100	77,175	77,150
California	832,000	.....	832,000	830,700
Colorado	129,000	.....	129,000	130,700
Eastern	39,900	.....	39,900	40,200
Florida	1,000	.....	1,000	1,000
Illinois	209,700	.....	209,700	211,500
Indiana	31,500	.....	31,500	31,700
Kansas	†267,900	.....	†267,900	†288,580
Kentucky	61,100	.....	61,100	63,500
Louisiana	924,075	126,650	1,050,725	1,050,675
North	107,075	6,150	113,225	113,175
South	817,000	120,500	937,500	937,500
Michigan	40,500	.....	40,500	32,900
Mississippi	132,450	3,850	136,300	136,300
Montana	76,000	.....	76,000	76,100
Nebraska	59,800	.....	59,800	60,100
Nevada	100	.....	100	100
New Mexico	282,000	6,500	288,500	288,500
North Dakota	59,000	.....	59,000	60,400
Oklahoma	†486,200	.....	†486,200	†501,800
Texas	2,374,000	87,900	2,461,900	2,461,900
Dist. 1	42,000	3,000	45,000	45,000
Dist. 2	100,000	8,200	108,200	108,200
Dist. 3	314,000	37,000	351,000	351,000
Dist. 4	163,000	18,000	181,000	181,000
Dist. 5	26,000	350	26,350	26,350
Dist. 6	102,000	9,000	111,000	111,000
East Texas field	123,000	.....	123,000	123,000
Dist. 7-B	126,000	150	126,150	126,150
Dist. 7-C	117,000	2,825	119,825	119,825
Dist. 8	958,000	6,500	964,500	964,500
Dist. 9	196,000	1,900	197,900	197,900
Dist. 10	107,000	975	107,975	107,975
Utah	108,500	.....	108,500	105,000
Wyoming	338,900	.....	338,900	342,500
Others	‡1,150	.....	‡1,150	‡1,200
Total U. S.	6,549,850	225,000	**6,774,850**	6,810,405
Change from prev. week, down			**35,555**	
Canada	†493,100	.....	†493,100	†549,000
Total U. S. Prod.-Jan. 1-June 11			1,152,371,400 bbl.	
Same period last year (crude plus cond.)			*1,167,782,300 bbl.	

*Includes 31,082,000 bbl. condensate. †Week ended previous Monday. ‡Alaska and South Dakota.

CRUDE-OIL PRODUCTION



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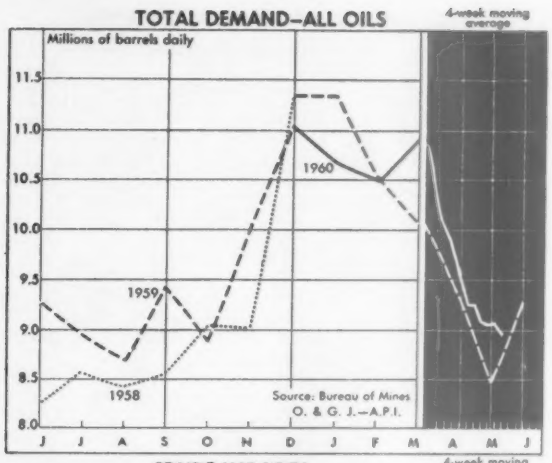

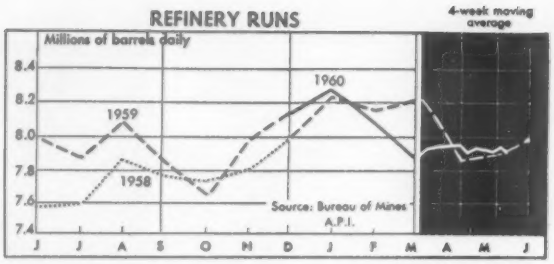

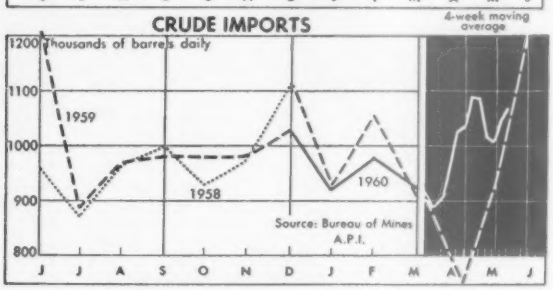

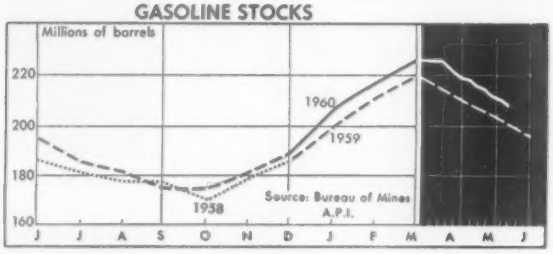

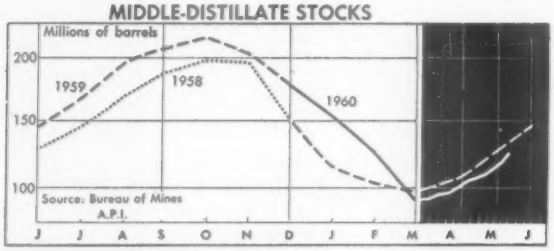

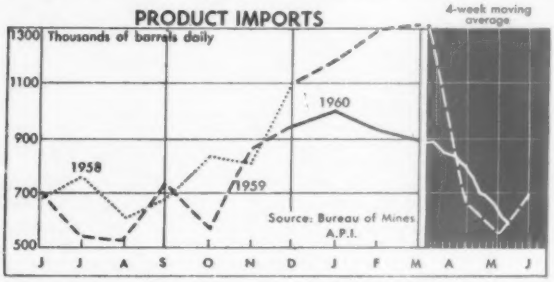

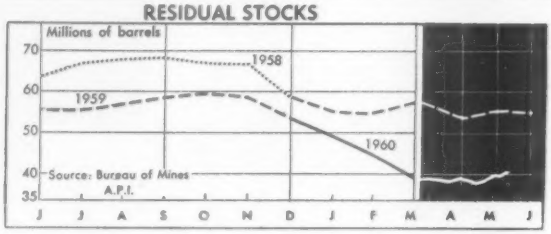

API REFINERY REPORT—JUNE 10, 1960
(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, June 1959 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,133	531.4	51.1	326.4	149.4	47,487	9,820	34,951	11,710	1,067	490.5	19.6	281.2	171.5
Appalachian:														
District 1	93	41.7	3.1	21.4	6.4	6,474	581	2,204	370	104	45.3	3.2	22.6	6.8
District 2	75	40.6	1.9	13.4	5.9	2,856	259	886	294	110	52.0	5.1	22.9	8.2
Ind., Ill., Ky.	1,398	777.1	60.3	310.3	135.7	37,267	5,142	17,611	4,463	1,497	777.9	62.7	302.4	147.9
Minn., Wis., Dak.	129	63.0	7.6	28.7	17.1	6,704	880	3,986	649	114	53.4	5.7	29.2	14.3
Okla., Kans., Mo.	729	402.6	18.0	176.6	14.3	19,339	1,211	8,865	967	759	417.3	12.8	179.0	23.7
Inland Texas	293	206.9	9.6	50.6	21.6	7,063	559	1,566	2,423	292	226.0	8.5	51.6	19.5
Tex. Gulf Coast	1,913	958.4	122.6	447.7	136.4	24,273	3,271	10,851	4,244	1,788	965.4	72.5	449.4	149.5
La. Gulf Coast	621	319.1	44.4	146.0	43.9	11,921	1,496	4,382	1,398	720	396.6	41.1	190.0	50.3
N. La. and Ark.	101	64.4	4.4	23.9	5.4	5,352	688	1,939	134	94	44.4	5.0	21.3	6.5
Rky. Mountain:														
New Mexico	24	12.6	0.4	4.4	2.6	811	37	236	33	24	12.3	0.1	4.6	2.6
Other Rky. Mt.	231	131.0	2.1	58.9	26.6	6,585	235	2,071	934	304	131.3	3.7	62.8	29.4
West Coast	1,096	585.3	46.6	169.3	256.0	31,803	1,609	11,575	12,775	1,117	516.9	3.8	174.6	284.7
June 10, 1960	7,836	4,134.1	372.1	1,777.6	821.3	207,935	25,788	101,123	40,394	7,990	4,129.3	243.8	1,791.6	914.9
June 3, 1960	7,961	4,134.7	325.1	1,749.3	889.9	209,908	25,017	96,667	39,733	.....	.....	.....	.....	.....
June 12, 1959	8,020	4,095.3	278.9	1,755.3	943.6	201,508	26,151	106,505	54,612	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil Prices

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	West Tex. (sour)	West Tex. (Inter.)	No.* Texas	Texas Refugio Light	Bayou Sale (La.)	Denver Jules-burg	Wyo. (sour)
14-14.9	$1.76	....	....	....	....	....	....	....	....
15-15.9	1.84	....	....	....	....	....	....	....	$1.81
16-16.9	1.92	....	....	....	....	....	....	....	1.86
17-17.9	2.00	....	....	....	....	....	....	....	1.91
18-18.9	2.08	....	....	....	....	....	....	....	1.96
19-19.9	2.16	....	....	....	....	....	....	....	2.01
20-20.9	2.24	$2.49	$2.35	$2.61	$2.29	$2.95	$2.90	$2.58	2.06
21-21.9	2.32	2.52	2.38	2.63	2.33	2.97	2.92	2.60	2.11
22-22.9	2.39	2.55	2.41	2.65	2.37	2.99	2.94	2.62	2.16
23-23.9	2.46	2.58	2.44	2.67	2.41	3.01	2.96	2.64	2.21
24-24.9	2.53	2.61	2.47	2.69	2.45	3.03	2.98	2.66	2.26
25-25.9	2.60	2.64	2.50	2.71	2.49	3.05	3.00	2.68	2.31
26-26.9	2.67	2.67	2.53	2.73	2.53	3.07	3.02	2.70	2.36
27-27.9	2.74	2.70	2.56	2.75	2.57	3.09	3.04	2.72	2.49
28-28.9	2.81	2.73	2.59	2.77	2.61	3.11	3.06	2.74	2.54
29-29.9	2.87	2.76	2.62	2.79	2.65	3.13	3.08	2.76	2.59
30-30.9	2.93	2.79	2.65	2.81	2.69	3.15	3.10	2.78	2.63
31-31.9	3.00	2.82	2.68	2.83	2.73	3.17	3.12	2.80	2.67
32-32.9	3.06	2.85	2.71	2.85	2.77	3.19	3.14	2.82	2.71
33-33.9	3.12	2.88	2.74	2.87	2.81	3.21	3.16	2.84	2.75
34-34.9	3.17	2.91	2.77	2.89	2.85	3.23	3.18	2.86	2.79
35-35.9	3.22	2.94	2.80	2.91	2.89	3.25	3.20	2.88	2.83
36-36.9	3.27	2.97	2.83	2.93	2.93	3.27	3.22	2.90	2.87
37-37.9	3.31	2.99	2.86	2.95	2.95	3.29	3.24	2.92	2.89
38-38.9	....	3.01	2.89	2.97	2.97	3.31	3.26	2.94	2.91
39-39.9	....	3.03	2.92	2.99	2.99	3.33	3.28	2.96	2.93
40-44.9	....	3.05	2.95	3.01	3.01	3.35	3.30	2.98	2.95

*Cooke, Grayson, Montague.

Flat Prices

Louisiana:
- Sweet Lake $3.00

Texas:
- East Texas 3.05-3.25
- Conroe 3.23-3.53
- Van 3.08

Pennsylvania Grade:
- Bradford $4.70
- Middle District 4.52
- Southwest Pennsylvania ... 4.25
- West Virginia 4.07
- Buckeye Grade 4.07

Illinois Basin 2.85-3.00

Foreign

Middle East, Persian Gulf (cargoes f.o.b. lifting port):
- Arabian, about 34°, Ras Tanura $1.90
- Iranian, 34.0°-34.9°, Bandar Masur 1.86
- Iranian, 34.0°-34.9°, Abadan 1.81
- Iraq, 36.0°-36.9°, Fao 1.82
- Kuwait, 31.0°-31.9°, Mina-al-Ahmadi 1.67
- Qatar, about 41°, Um Said 2.05

Middle East, E. Mediterranean:
- Arabian, about 35°, Sidon .. 2.29
- Iraq, about 35°, Tripoli, Banias (Grade A) 2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):
- Seria Light, 37° 2.57

Canada:
- Leduc-Woodbend $2.53
- Redwater (Alta.) 2.42
- Smiley (Sask.) 2.18
- Pembina 2.38

Venezuela:
- Cumarebo, 47°-47.9°, Tucupido 3.34
- San Joaquin, 40°-40.9°, Puerto La Cruz 3.08
- Oficina, 35°-35.9°, Puerto La Cruz 2.80
- Tia Juana medium, 26°-26.9°, Amuay* 2.30
- Quiriquire, 16.0°-16.4°, Caripito 2.10
- Lagunillas heavy, flat, Las Piedras* 2.10
- Bachaquero, flat, 15°-16°, Las Piedras* 1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Tanker Rates (Long Ton)

(Latest reported spot fixtures)

Gulf-NY, clean (ATRS—20%)		$2.28
Carib.-NY, dirty (ATRS—60%)		1.10
Carib.-UK, dirty (Scale—62.5%)	(7s. 6d.)	1.70
PG-Japan, dirty (USMC—75%)		2.55

★Denotes change from previous week.

Refined-Product Prices

Following quotations are realistic spot prices for refined products moving interstate on Wednesday each week. They may differ from refiners' posted prices and should not be considered as postings.

Light-product prices are in cents per gallon. Residual and crude prices are dollars per barrel. Crude prices are at the well unless otherwise listed.

Gasoline*

Mid-Continent (Group 3):
- ★ Regular (91 octane) . 11.50
- ★ Premium (99 octane) 14.25
- Natural gasoline (26-70) 4.5
- Breckenridge 4.0

Gulf Coast (cargoes for coastwise or export movements):
- Regular (90 octane) .. 10.25-10.50
- Regular (92 octane) .. 10.50-10.75
- Premium (98 octane).. 11.50-11.75

California (rack) Los Angeles:
- Regular (88 octane) .. 11.65-12.15
- Premium (94 octane). 12.65-13.15
- Premium (100 octane) 14.00-14.65

Caribbean area (cargoes):
- Regular (87 octane) .. 10.00
- Premium (97 octane) .. 11.625

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

Kerosine and Distillate

Mid-Continent (Group 3):
- Kerosine 42-44 ..... 9.00-9.25
- Diesel oil (58 d.i. and above) 8.75-9.00
- Distillate No. 1 ..... 8.75-9.00
- Distillate No. 2 ..... 7.75-8.00

Gulf Coast (cargoes):
- Kerosine 41-43 ..... 9.00
- Distillate No. 2 ..... 8.00

New York Harbor (barges):
- ★ Kerosine 41-43 ..... 10.05
- ★ Distillate No. 2 ..... 9.05
- ★ Diesel fuel, 48-52 d.i. 9.35

Caribbean area (cargoes):
- Distillate No. 2 ..... 8.00

Residual Fuel (Bbl.)

Mid-Continent (Group 3):
- ★ Residual fuel (max. 1% S) $1.80

Gulf Coast (cargoes):
- Bunker C fuel 2.10-2.25

New York Harbor (barges):
- Bunker C fuel $2.47

Caribbean (cargoes):
- Bunker C $2.10

California (rack):
- Bunker C fuel, Los Angeles $2.15

★Denotes change from previous week.

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200,000 ft.	8 5/8"	28#
400,000 ft.	10¾"	35#
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4101 SAN JACINTO, HOUSTON, TEXAS

FOR SALE EQUIPMENT

WHEATLEY PIPE-LINE pump—Model WBL-141, duplex reciprocating, 6—7" x 10" side pot valves, skid-mounted; with 100 Hp. electric motor, 3/60/440V, v-belts, sheaves and etc; Complete. One Fractionating Tower —4' x 65', 50 psi. with 25 Trays. Welded. Two Stripper Towers—One 30" x 27' welded; One 24" x 16' welded. Both with bubble trays; Bargains. Kinslow Equipment Company. P. O. Box 5283, Tulsa, Oklahoma. WE 9-6896.

LIQUIDATION

at ESSO REFINERY Balto., Md.

10,000 BBL/DAY FLUID COKER
COMPLETE—NEW 1955
STILL ON FOUNDATIONS

TOWERS

10' x 145'—125 PSI 50 trays
9'6" x 121'—325 PSI 30 trays
8'6" x 103'—165 PSI 24 trays
7'0" x 82'— 75 PSI 30 trays
6'0" x 80'—300 PSI 30 trays
4'0" x 44'—150 PSI 12 trays
3'6" x 36'—400 PSI 12 trays
2'6" x 52'—350 PSI 22 trays
2'2" x 57'— 85 PSI 4 trays

HEAT EXCHANGERS—CONDENSERS

Steel Tube	7,500 to 180 sq. ft.
Adm. Tube	3,500 to 236 sq. ft.
Cu Ni Tube	2,338 to 308 sq. ft.
S. S. Tube	1,000 to 170 sq. ft.

CLARK COMPRESSORS
RAS GAS ENGINE 2VTH 17" x 14" CYL

BLOWERS—28,000 CFM @ 17 PSIG
11,880 CFM @ 11 PSIG
INSTRUMENTS—Controllers, Recorders, Indicating and Transmitting
MOTORS—10 HP to 500 HP XP
PIPE CHROME—3¼" to 14" OD
PUMPS—Hot Oil, Steam, Centrifugal
REACTOR—8' x 32'6" OA
REBOILERS—2,700 to 450 sq. ft.
TRANSFORMERS—5 KVA to 333 KVA
VALVES—Diaphragm, Butterfly Slide and Pressure Regulating
VESSELS PRESSURE—3' to 12' Dia.

PETRO CHEM FURNACE
1.9 MILLION BTU NEW 1949

WRITE FOR COMPLETE CATALOG

HEAT & POWER CO. INC.
60 East 42nd St., New York 17, N.Y.
310 Thompson Bldg., Tulsa 3, Okla.
Box 5203, Baltimore 24, Maryland

NEW IDECO RIGS AND MACHINERY

RECONDITIONED AND USED MACHINERY

USED RIGS

FOR RENT: USED IDECO 133' Full View Drilling Mast on 8' high x 46-10" long Substructure. Attractive Rate.
FOR LEASE: USED BREWSTER N-4 Rig Complete. Gas-Butane Power. 93' Lee C. Moore Mast. 5600' of 4" O.D. Drill Pipe.
FOR SALE: USED WAUKESHA 6LRZ Engine with Fawick Clutch mounted on Extended Skid with V-Belt Sheave and Roller Bearing Pillow Blocks.
FOR SALE: USED IDECO H-35 Hydrair Torque Converter Draw Works with 2—Waukesha 6WAK Gas-Butane Engines.
FOR SALE: Two USED BOWEN 7⅜" O.D. Double Bowl Overshots.
FOR SALE: 3,250' USED 4½" Grade E Drill Pipe with 6" O.D. Tool Joints. Inspected, Tested and Graded for Unlimited Service.
FOR SALE: 7,000' NEW 4½" Grade E Drill Pipe. 10% Discount.

LUCEY

LUCEY PRODUCTS CORPORATION
624 So. Cheyenne Tulsa 19, Oklahoma
Phone: LUther 4-4711
Oklahoma City—Woodward, Oklahoma • Dallas—Odessa, Texas

FOR SALE EQUIPMENT

COMPLETE PIPELINE CONSTRUCTION SPREAD
From 30" Down to Smaller Diameter Pipe

Catepillar Tractors (2U and 3T); 320 Cleveland Ditchers; Insley Backhoes; Insley Draglines; Littleford 25-Barrel Dope Pots; C-R-C Bending Machine; M. J. Crose Boring Machine; Ingersoll-Rand Air Compressors; Ample Miscellaneous items to complete a spread of equipment.

Equipment purchased new—most at the same time. Has not worked 50% of time—has laid less than 1,000 miles of pipe. Equipment in good working condition—always been well maintained.

You are invited to inspect equipment. Detailed list of spread with serial numbers furnished on request.

EASTERN PIPELINE CONTRACTORS
820 Mercantile Bank Building, Dallas, Texas

MAYHEW MODEL 2000 on I.H.C. Tandem. 48' mast. 5 x 8 pump and booster, 2—⅞ x 20 drill pipe. Extra truck and trailer. Complete—now drilling. Write for Inventory. Box L-878, The Oil and Gas Journal, Tulsa, Oklahoma.

1—36L BUCYRUS-ERIE drilling machine, 1950 model, skid mounted, with 1956 140 GK Waukesha engine; casing strut, derrick crane casing line. A-1 condition at an exceptionally low price. Located in our yard. Degen Pipe and Supply Co., Tulsa, Oklahoma.

2000' SHOP built double drum rotary with 50' derrick on dual wheel axle, 5x10 mud pump with motor, Kelly, 2 short 5¾" drill collars, some 4½" drill pipe & subs, 1 International winch truck and single axle float, 1 Ford truck to pull rig, Lincoln 200 amp welding machine. $10,500.00 Box 212, Phone 3831, Laverne, Oklahoma.

1—4½ x 6 Gardner Denver pump. 1—5 x 8 Gardner Denver pump. 1400'—2⅜ x 20 Mayhew drill pipe—good condition. 1—56' Sectional Mast for Joy 200. Box L-877, The Oil and Gas Journal, Tulsa, Oklahoma.

LIKE NEW 2900' of 2⅜" flush joint drill pipe, four threads per inch. One 10' core barrel. One 4½" O.D. x 20' drill collar. Will sell in total $4,000.00; individual prices on request. Creek Oil & Gas Co., Inc. Box 377, Chanute, Kansas. Telephone 3035.

FOR SALE

200,000 Ft. of 3½" O.D. Seamless A-1 Used Locomotive Tubes, Clean Inside and Out. Roller-Beveled Ends. 18' and over in lengths.

Wire, Write, or Phone

COLUMBUS STEEL SUPPLY
1000 BONHAM AVE. • AX 4-4461
COLUMBUS, OHIO

NEW CROLOY 5 HEATER TUBES
Priced at ½ New Cost

Must Move at Once

14—3¾" x ¾" wall x 44' long
63—4" x ¾" wall x 26' long
10—4" x ¾" wall x 32' long
50—4" x ½" wall x 32' long
3—5" x ½" wall x 42' long
42—6" x ½" wall x 27' to 47' long

HEAT & POWER CO., INC.
60 E. 42nd St., N. Y. 17, N. Y.
310 Thompson Bldg., Tulsa 3, Okla.

FOR SALE EQUIPMENT

FOR SALE: Small gas treater for hydrogen sulphide removal. Unit recently shut down and in good operating condition. Box L-885, The Oil and Gas Journal, Tulsa, Oklahoma.

1—LATE MODEL NKRBU Waukesha with skids and power take off. 1—WAK Waukesha reconditioned with skids and power take off. 1—Twin Disc Model F Torque Converter. All priced reasonable. Claypool Drilling Company, St. Elmo, Illinois, Phone: TAylor 9-3232.

EQUIPMENT WANTED

SONOLOG, ECHOMETER, or Acoustic Well Sounder. Box 1388, Wichita Falls, Texas.

FAILING 2500, Joy 300, or Franks 35 Drilling Rig. With or without accessories. Forward complete details first letter. Must be priced right for quick sale. Box L-871, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

FOREIGN—DOMESTIC Employment Oil, Chemical, Industrial. Write for details without obligation. Accredited Personnel Services, P. O. Box 6006, New Orleans 14, La.

NEW OIL JOB Directory, foreign and domestic, showing where to apply for jobs. 500 selected producing, refining, butane and pipeline companies. Nationwide, $5.00 cash. OIML Co., Box 2603, Tulsa, Oklahoma.

CHEMICAL ENGINEER

Graduate chemical engineer with from 1 to 3 years refinery process engineering, preferably including some refinery economics and computer experience. Assignment will be in newly organized computer section.

Send resume of education, experience and salary requirements to:

Personnel Manager
National Cooperative Refinery Ass'n.
McPherson, Kansas

SUPERVISOR FOR REFINERY BLENDING SCHEDULING AND PLANNING SECTION

Immediate opening exists with a Caribbean Oil Refinery for a position entailing product blending, shipment scheduling, and refinery operations planning. This position requires a man with approximately five years experience in practical blending, shipment scheduling, and operations planning, as well as the ability to use mathematical techniques to improve existing blending methods.

Apply, Box L-867
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

GEOLOGIST TO take charge of exploration for small but aggressive company operating chiefly in the Anadarko Basin. Prefer independent background with good field experience. An excellent opportunity for the right man. Send complete resume including experience, transcripts and references. We will contact you in regard to an interview. Box L-868, The Oil and Gas Journal, Tulsa, Oklahoma.

STAFF ENGINEER: Large, independent, integrated oil company with home office in Southwest has opening Natural Gasoline Dept. Must have had a minimum of 3 years experience in design and operation of natural gasoline plants and facilities. Graduate engineer with major in chemical, petroleum or refining. Submit complete resume. Box L-879, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER

Interstate gas transmission company has opening for graduate petroleum engineer with minimum of one year's experience for appraisal of gas reserves and availability. Position in main office, Houston.

TRUNKLINE GAS COMPANY
P. O. Box 1642, Houston 1, Texas

OIL REFINERY ENGINEER

Permanent position for young engineer with rapidly expanding independent oil refinery. Duties will encompass all phases of refinery engineering, including design, contract preparation, supervision and inspection of construction. Mechanical engineering degree or comparable with approximately five years refinery or chemical plant experience in both field and design phases. Age to 30. Salary commensurate with experience and potential. Forward full resume and salary requirements to:

Personnel Manager
Hess Trading & Transport, Inc.
Box 200, Port Reading, N. J.

SITUATIONS WANTED

PETROLEUM ENGINEER (BS)—25 single. Desirous of changing position. Locate anywhere. Resume upon request. Box L-862, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, 18 years of field and supervisory experience in drilling, production and reservoir engineering. Background includes work in United States, South America, Africa and Middle East. Speaks Spanish and French. Desires responsible position with producing company operating overseas. Box L-870, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM PRODUCTION Engineer: Age 34, married. 4 years experience domestic major, 4 years production supervisor, Venezuelan major. Desires position with aggressive domestic independent or foreign. Box L-872, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT—Geologist: 35, married, conscientious. Ten years experience in Oklahoma, Kansas, Colorado as production and drilling supervisor, explorationist. Salary nominal—Available two weeks notification. Box L-875, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST Age-26. B.S. Degree from O.U. Two years exploration experience, Mid-Continent. Excellent success ratio. Jim Mundy, Pawhuska, Okla.

PETROLEUM—NATURAL GAS ENGINEER, 27, family, five and one half years experience, drilling, completions and research. Desires challenging position in eastern United States. Box L-884, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-ATTORNEY

Seven years major and independent companies, available August 1. Now controller-general office manager for independent firm. Licensed four states. Wide knowledge titles, trades, finances, accounting systems. Able to trade for maximum tax effect. Complete resume available. Charles Ben Howell, 805 Newell Ave., Dallas, Texas.

SITUATIONS WANTED

ATTORNEY, B.B.A. in Accounting, LL.B. from S.M.U., LL.M. in Federal Taxation from N.Y.U., 7½ years experience in oil and gas and federal taxation matters—4½ years major oil company—3 years private practice. Married, presently in private practice, desire change to other private practice or corporation. Box L-880, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER—Four years petroleum refinery experience, including pilot plant studies, trouble-shooting, operating supervision, some maintenance, economics and forward planning. Desires supervisory position medium sized oil or petrochemical company. Resume or request. Box L-881, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST - ENGINEER (BS) - Western Canada, Williston Basin, Oklahoma, and Texas. 4½ years experienced in all phases of geology and production. 1½ years tubingless completions. Consultant for past year. Desires responsible position with active independent. Box L-883, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, '48 graduate, experienced all phases petroleum exploration including surface, subsurface, geophysical coordination and planning in Canada, U. S., South America. Background includes successful exploration supervision. Desires foreign position. Box L-855, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

HIGHEST PRICE paid for income royalties, overrides, oil properties. A. S. Berry. 109 Midco Bldg., 302 South Cheyenne, Tulsa, Oklahoma.

NOTICE INVESTORS, income producing oil, gas-distillate royalties for sale. Ogden Oil Company. P. O. Box 490, Taylor, Texas.

WANT LISTINGS of producing royalties and non-producing royalties. Give full information. R. E. Clement, Box 65, Norman, Oklahoma.

LEASE AND DRILLING BLOCKS

SEVEN wells Louisiana: 1,500' Wilcox sand, 113 acres, 20 proven locations. $35,000. C. R. Harwood, 500 Grant Street, Denver, Colorado. Phone Spruce 7-4493.

3,500 ACRES $2 per acre. Lawrence County, Ky. in midst of new gas play. Ten year leases in first year, ⅛ override, no drilling committment, 50 cents per acre annual rental. U. S. Andersen, 8350 Santa Monica Blvd., LA 46.

FOR ASSIGNMENT 590 acres Ohio County, Ky. Two miles north of Hartford. Bordered on two sides by definite faults. A. J. B. Oil and Exploration Co., P. O. Box 1121, Harlingen, Texas.

NOTICE OF PROPOSED SALE OF OIL AND GAS LEASES AND OTHER PROPERTIES BY TEXAS CONSOLIDATED OILS

This is to give notice that Texas Consolidated Oils, 35th Floor Southland Center, Dallas 1, Texas, desires to sell all of its producing and non-producing oil and gas leases in Texas, Oklahoma, New Mexico, Louisiana, Kansas and California; and other related property. Anyone interested in making a sealed bid for the purchase of these properties may obtain bidding forms and a statement of the terms and conditions relating thereto, with a schedule of property being offered for sale attached, by writing the Company at the above address. A packet containing individual lease plats, production data, and other general information will be available to prospective bidders upon deposit or One Thousand Dollars ($1,000.00). Such deposit will be returned by the Company to any party making a bid on these properties or upon return of the packet of data forty-eight (48) hours or more in advance of 10:00 A.M. Central Standard Time on July 15, 1960. Bids for the properties will be considered only if made in accordance with and subject to the terms and conditions set forth in such statement. All bids must be presented to or received by:

The Trust Department
Republic National Bank of Dallas, Texas
before 10:00 A.M., Central Standard Time
on July 15, 1960

LEASE AND DRILLING BLOCKS

PROSPECTIVE OIL Land: Suitable townsite acreage in fee, E/35 acres, Sec. 16, Block JKL, PSL Survey, Hudspeth County, Texas, at intersection U. S. Highway 62 and F. M. 1437 Highway, south of Dell City, Texas. Write quickly, Jefferson G. Smith, 715 Littlefield Building, Austin 15, Texas.

MICHIGAN OIL gas leases, blocks and drilling deals. Lease Broker, member Petroleum Landmens associations. Neil Wagenaar, 504 Peoples Natl. Bank Bldg., Grand Rapids, Michigan.

80 ACRE AND 90 acre leases in proven area. Need additional capital for drilling and completion. Shallow production Montgomery County, Kansas. S & M Drilling Co., Box 98, Cherryvale, Kansas.

THOUSAND acres covering complete old pool, drilled 1904-1916, 8 wells still pumping, average depth 700 feet. Little water, low pressure, water available for flood. Charles Howard, Monticello, Kentucky. Phone FIlmore 8-2461.

EASTERN KANSAS proven Bartlesville production 740 ft. deep, 8 inside locations, 4/8 working interest for sale. $500.00 per 1/8 to drill No. 1. For details write: Box L-882, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL FARM OUT 160 acres on immediate drilling commitment in Woodward County, Oklahoma, Sec. 20 T. 24 N. Range 20 West. Only responsible people considered. Oexner Oil Producing Co., 318 Adams Bldg., Danville, Illinois.

FOR SALE in Breckinridge Ky. 13,000 acres of oil and gas leases. 5 year terms, 10,000 acres straight 5 years, no rental. Over 100 producing wells in county. Several rigs now drilling. $1.50 per acre. Depth to Devonian formation 900 to 1200 ft. Call or write: Phone SK 6-2078—Hardinsburg Ky., call after 5 P.M. Rosco Kiper, Kingswood, Kentucky.

OIL VENTURE IN EASTERN KENTUCKY

800 acres in Owsley and Jackson counties, located to old gas and oil production that makes it look good, never been drilled, Corniferous about 1200 feet, deeper pay being produced in joining County. Want finance to drill and produce, split profit basis.

C. V. Porter
Box 868, Bowling Green, Kentucky

BUSINESS SERVICE

DELAWARE CORPORATIONS formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

HENDRIX & McCLAIN, INC.

GEOLOGICAL CONSULTANTS

Serving the Oil and Gas Industry
in
Eastern Colorado
and
The Gulf Coast

1340 Saratoga Bldg.
JA 2-6330 and JA 2-4364
New Orleans 12, Louisiana

BUSINESS OPPORTUNITIES

INQUIRIES SOLICITED by investors interested in participating financially in the drilling of wells for oil and gas. Speculative but financially attractive. J. P. Tucker, Box 951, Longview, Texas. 30 years experience.

NEW PRODUCTS WANTED—Well-established, responsible company with complete facilities for developing, manufacturing and marketing oil field equipment is seeking new or improved products, preferably patented or patentable to add to its presently well-known line. Royalty basis or outright purchase. Initial submission should identify product and general use without revealing engineering and confidential detail. Submissions will be handled promptly and confidentially. Box K-994, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

FINANCIAL Contacts, Underwriters, Private Brokers reached. No shopping. Confidential. Send details to Consultant—817—51st Street, Brooklyn, N. Y.

ATTENTION MANUFACTURERS

Nine thousand sq. ft. of new building area, personnel, and equipment available for the manufacture, assembly and storage of your product in Canada.

GEORGE CARRAHER
9724 141 St.
Edmonton, Alberta, Canada

PRODUCTION WANTED

WE WANT TO BUY OIL PRODUCTION

Any amount for cash and/or stock. We are listed on a national stock exchange.

R. C. Qualls, Vice President
SAGE OIL COMPANY
505 Patterson Building
Denver 2, Colorado

PURCHASE OIL & GAS PROPERTIES

Principal wishes to purchase developed reserves. Location no factor. Confidential and expeditious consideration of any property between $50,000 and $5,000,000. Brokers protected.

Write or call our agent:

R. A. MASON, Petr. Engr.
2212 First National Bldg.
Oklahoma City, Oklahoma
Phone: CEntral 5-4468

REAL ESTATE

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EXECUTIVES MOVING TO HOUSTON WHO NEED A FINE HOME

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Cantrell & McMillan
Builders of Fine Homes
P. O. Box 7601
Houston 7, Texas

MANUSCRIPTS

HAVE YOU WRITTEN A BOOK?

If you have a book manuscript or outline for a book on an oil industry engineering, operating or technical subject—we are in a position to help you get it published. Write briefly outlining what you have!

Write to—L. B. Lofton
THE OIL AND GAS JOURNAL
P. O. Box 1260—Tulsa 1, Okla.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Salt Lake City, Utah. Notice is hereby given that approximately 80 acres of unsurveyed land in one parcel within the undefined known geologic structure of the Harley Field Area, Grand County, Utah, will be offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 1:00 P.M., M.S.T., July 15, 1960, when bids will be opened. Full details of the lease offering, and how and where to submit bids, may be obtained from the Land Office Manager, 3rd Floor Darling Building, Salt Lake City, Utah.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that approximately 1035.51 acres of land within the Navel Auxiliary Air Station, Chase Field, Bee County, Texas, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1:00 P.M., E.D.T., July 13, 1960, when bids will be opened. Details of the lease offering, how and where to submit bids, may be obtained from the Director, Bureau of Land Management, Department of the Interior, Washington 25, D. C., the Land Office, Bureau of Land Management, P. O. Box 1251, Santa Fe, New Mexico; the Branch of Oil and Gas Leasing, Geological Survey, General Services Administration Building, Washington 25, D. C.; or the Regional Oil and Gas Supervisor, Geological Survey, Gulf Coast Region, 204 Maritime Building, 203 Carondelet Street, New Orleans, Louisiana. Edward Woozley, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Land Office, Cheyenne, Wyoming. Notice is hereby given that 355.09 acres of land in two parcels, within the known geologic structure of the Clareton field, Weston County, Wyoming, are offered for competitive oil and gas leasing through sealed bids to the qualified bidder of the highest cash amount per acre at 2:00 P.M., MST, August 3, 1960, when bids will be opened. Full details of the offering, and how and where to submit bids, may be obtained from the Land Office, Cheyenne, Wyoming. Arvin H. Olswold, Chief, Minerals Adjudication Unit.

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IT'S BEST . . .
to send your old address clipped from the Journal mailing wrapper along with your new location.

ADVANCE NOTICE . . .
10 days before you move, and we guarantee you week-to-week undelayed service.

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Circulation Department

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Box 1260 **Tulsa 1, Okla.**

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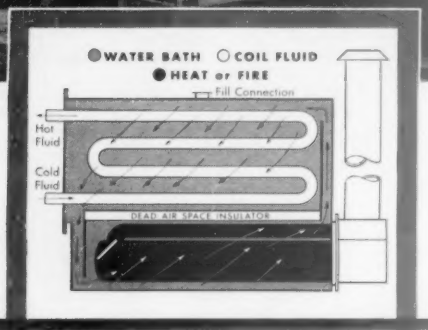
PROBLEM

Replace boilers and heat exchanger (required by law to have full-time attendant) for eventual fully automatic or remote control pump station

SOLUTION

Two NATIONAL® 7′ x 32 1/2′ Indirect Heaters



IMPORTANTLY — These heaters employ a liquid heat transfer medium and have novel features of construction whereby circulation of the medium is effected thermo-siphonically at high velocity. This provides maximum heat transfer efficiencies throughout the heaters and eliminates additional water supply.

All equipment designed and manufactured for or by National Tank Company.

Patented

For this East Texas pipeline, National designed indirect heaters to raise the temperature on 15,000 BOPD of 20.9° gravity crude from 50° to 115° with a maximum pressure drop of 12 psi.

The heaters were equipped with standard accessories and three additional safety devices:

1. Low level shutdown in case of low water level
2. High level shutdown in case of coil rupture
3. Safety shutdown in case of gas failure to burner

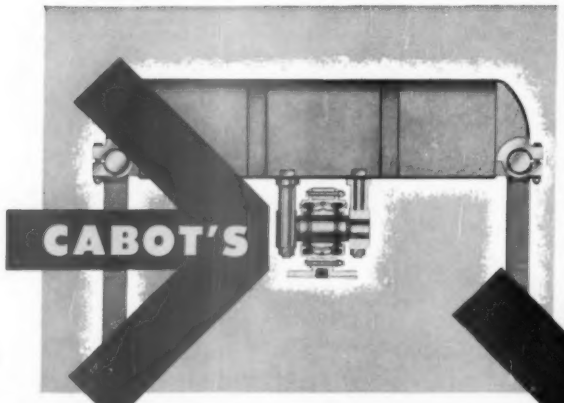
The installation of the two National Indirect Heaters resulted in releasing a full-time boiler attendant for other duties PLUS providing fully automatic operation.

NATIONAL INDIRECT HEATERS FOR HIGH PRESSURE GAS, OIL AND WATER ARE AVAILABLE IN WORKING PRESSURES TO 15,000 PSI TEST

It's a National®

NATIONAL TANK COMPANY

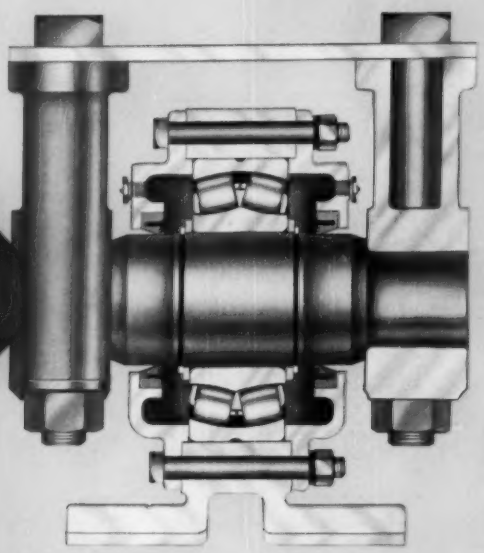
TULSA, OKLAHOMA



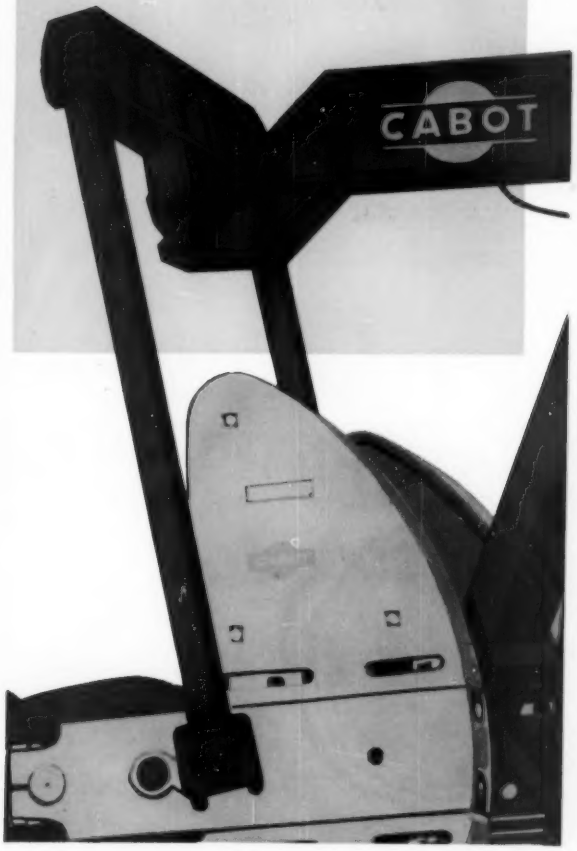
CABOT'S

NEW EQUALIGN BEARING

PUMPING UNITS
THAT STAY YOUNG LONGER



CALL YOUR J&L MAN



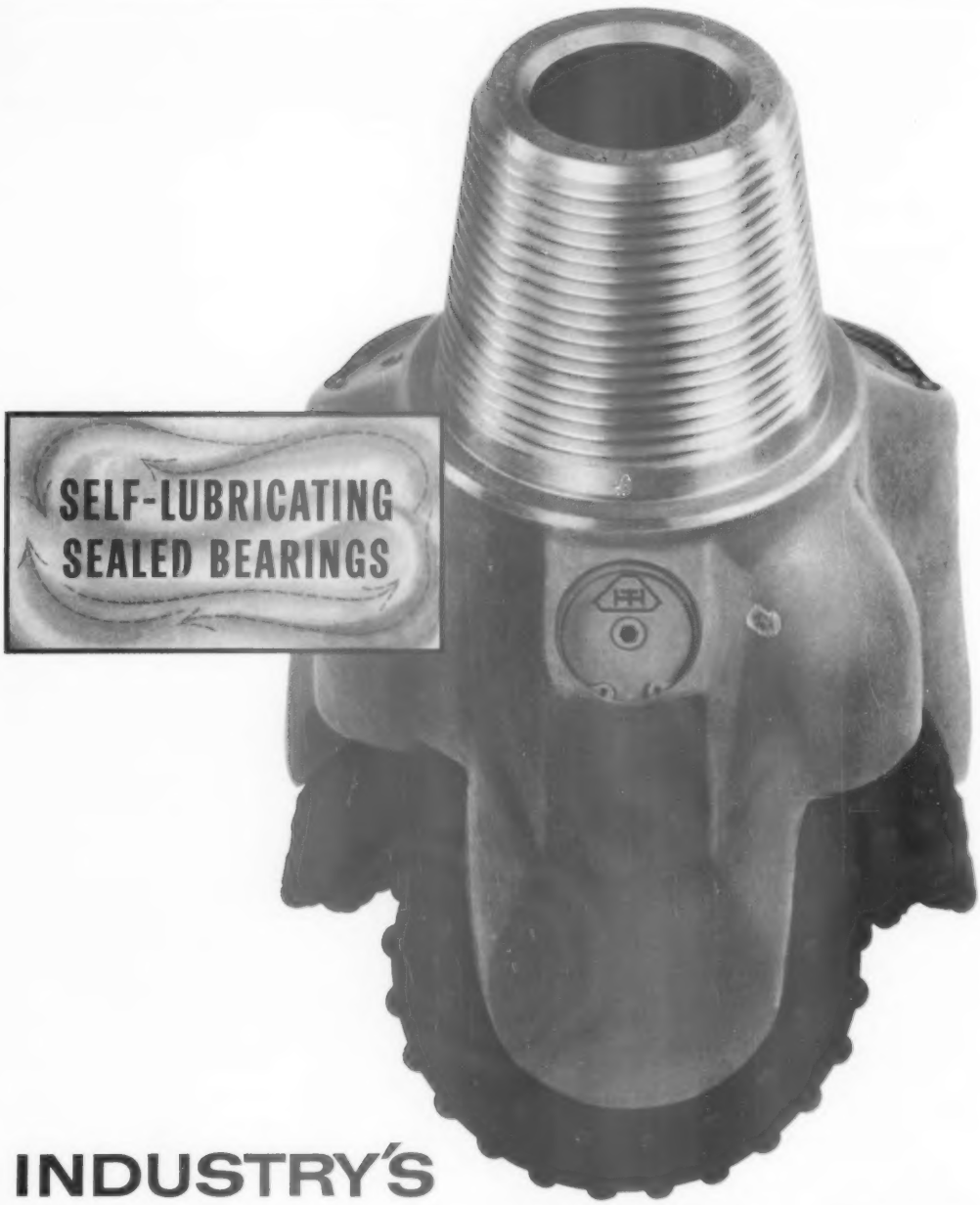
Our engineers advise us that our new Equalign Pumping Units have many improvements as well as geometric design for equal torque factors.

We advise you to see this new series at your nearest J & L Supply store, for here are units engineered for long, trouble-free life — backed by Cabot's 24-hour field service . . . another reason why it pays to get the Cabot habit.

✳ New Equalign Bearing

The Cabot Equalign Bearing contains a heavy duty spherical roller bearing which gives universal equalization. Grease and relief fittings are arranged so that grease is forced through the bearing with each greasing. The pumping units equipped with this type bearing are designed for equal torque factors. Pin-end pitmans are used.

OIL FIELD PUMPING EQUIPMENT
CABOT
PAMPA, TEXAS
FRANKS
DIVISION OF CABOT



INDUSTRY'S MOST TALKED OF NEW BITS

NOW IN PRODUCTION AT HUGHES

A new kind of Hughes bit – the *self-lubricating* sealed bearing bit – is rolling off the production line. It represents a major design breakthrough in an era of outstanding rock bit research achievements.

Two sizes are available (7⅞" and 8¾") in two types (RG-1XJ and RG-7XJ). By year end, sizes in all existing R-Series types will be expanded to include 7⅞" through 12¼".

Development is continuing in the use of *self-lubricating* sealed bearings in other bit types and in smaller R-Series sizes.

Field reports indicate the *self-lubricating* sealed bearing bits are living up to and frequently exceeding performance expectations. The best results are being obtained where Hughes recommended weights and rpm's are being followed.

You can depend upon Hughes for the latest in rock bits!

HUGHES TOOL COMPANY®

ORIGINATOR AND WORLD'S LEADING DEVELOPER OF CONE-TYPE ROCK BITS